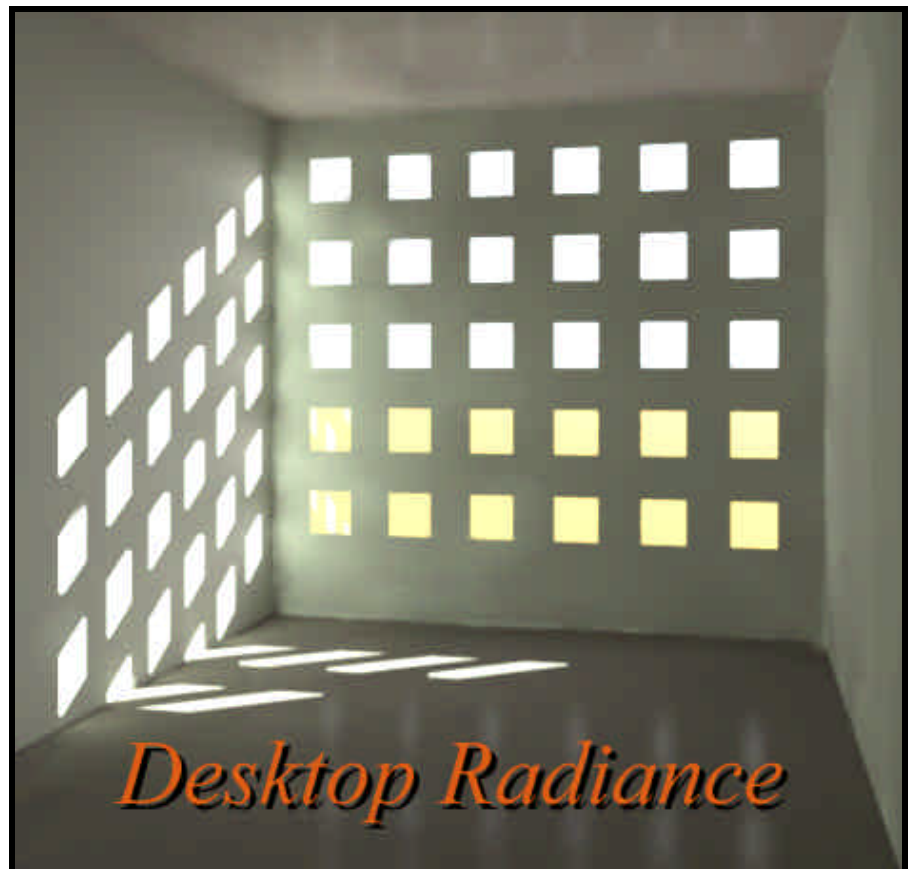**Desktop Radiance 2.0 BETA**

User Manual

Lawrence Berkeley National Laboratory
Environmental Energy Technologies Division
Building Technologies Department

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Desktop Radiance

Introduction

Desktop Radiance is a design tool that facilitates the design and analysis of buildings to optimize the efficiency of daylighting systems and lighting technologies. Desktop Radiance is a plug-in module that works with other popular computer aided design (CAD) tools to provide the user interaction and 3-d modeling capabilities. Desktop Radiance relies upon the popular *Radiance Synthetic Imaging System* to provide its renderings and analytical results.

The first step in the process of performing a daylighting analysis is the creation of a 3D model in a Graphic Editor program, such as AutoCAD (See **Setting Up A Drawing**). The 3D model can then be detailed appropriately using the Desktop Radiance library of materials, glazings, luminaires and furnishings. Once the model is complete, you then define the analysis parameters such as camera views or reference point calculations, building orientation and zone of interest. Then you set up a rendering or point calculation using the simulation menu commands that initiate the export of the geometry and analysis parameters. See the **Simulation Manager** for more information about starting your simulations and **Image Analyzer** for more information about analyzing your results.

This document is not intended to be a comprehensive discussion of the appropriate modeling techniques for daylighting design. It is assumed that you are familiar with daylighting design and fairly familiar with general 3-d modeling and AutoCAD in particular. You may wish to browse the Quick-start Tutorial for a brief introduction to the various 3-d geometric primitives and how they can be assembled into a model of a simple office space.

This document is organized according to the menu structure of Desktop Radiance as found in Version 2.0 BETA as of December 1, 2000. It is also available through the on-line, context-sensitive help system for Desktop Radiance.

Graphic Editor

Introduction

The Graphic Editor (AutoCAD for this document) is where you create the 3-D representation of the geometry of the space you are designing. All of the AutoCAD native commands are available for this purpose. Desktop Radiance adds the "Radiance" menu item to the AutoCAD menubar.

Figure 1. The Main Radiance Pulldown Menu

It is from this menu that all Desktop Radiance commands are accessed. In most cases, you first select the command, and then follow the prompts to provide the requested information such as selecting the surfaces onto which you wish to perform some action. In some cases the command leads to a dialog box which requires your input. The following pages will explain each Radiance menu item in detail.

Setting Up A Drawing

When you first open a drawing with the Desktop Radiance icon, you will see the Desktop Radiance Preferences Menu Figure 2

Figure 2
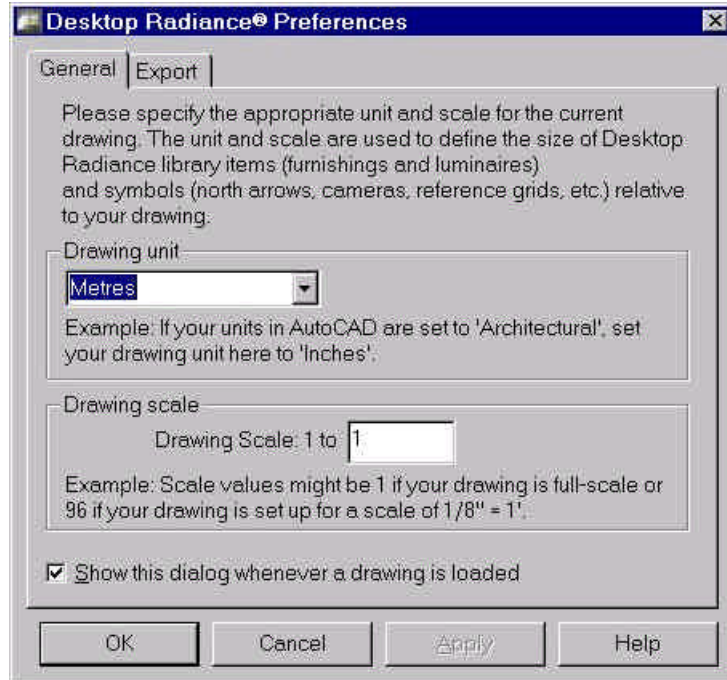
Figure 2. The Desktop Radiance Prefrences

The Preferences dialog box will appear everytime unless you uncheck the "Show this dialog whenever a drawing is loaded" option. The best way to get started with modeling your building is to set up your drawing units. AutoCAD and Radiance are both "unitless" modeling systems. This means the "size" of a unit of distance is defined by the user and implemented as a convention. Sometimes a scaling factor is also used which causes the unit to be proportionately larger or smaller than its base unit size. These settings for your drawing can be defined in the Preferences Dialog Box see **Preferences**. Once you have set up the units you are ready to start modeling and making attachments from the Radiance menu. Below we will discuss each menu item in turn starting with the Materials menu item.

Materials

Materials can be attached to any surface in your graphic editor 3-D model. Radiance is equipped with an extensive library of materials. You can also create your own materials using the Material Editor that can be reached through Radiance → Materials → New Materials or through the Library Manager. For more information on creating your own materials, see **New Material** or **Material Editor**

Attach materials

The Materials Library dialog box *(Figure 3)* contains the database of available materials that can be attached to surfaces in your drawing.
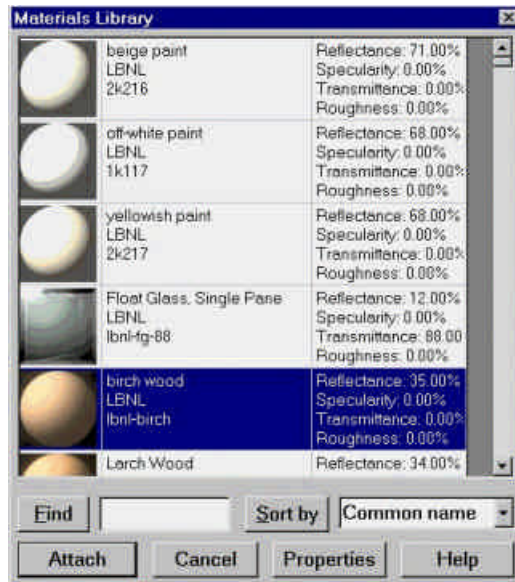
Figure 3. The Materials Library Dialog Box

To access the Materials Library Dialog Box, first use the menu command
Radiance→Materials→Attach Material, then when prompted, select the surface or
surfaces that you want to attach a material to. After selecting surfaces you then press
<enter> (this implies, no more surfaces to select) and the Materials Library Dialog
Box will appear.

Scroll through the list and choose a material. After selecting a material, click the
ATTACH button at the bottom of the Materials Library dialog box. Doing so brings
back the AutoCAD window and associates the material to the selected surface. In
AutoCAD, the surface will not change appearance; in other words, the line color will
not change. Repeat the process for other surfaces in your model. Only one material
can be attached to each plane or surface. In other words, two materials cannot be
attached to the front and back of a surface.

You can sort the material library to make it easier to find a specific material. The
Materials Library can be sorted by the common name of the material, its
manufacturer, the manufacturer's product code, the source of the data (the person or
company that entered it into the database), or by the material's reflectance,
transmittance, specularity, or roughness. To sort the materials, select the desired
property in the drop-down list box next to the "SORT BY" button. Then click
"SORT BY". You can click again to reverse the sort order.

Alternatively, you may search for a material by using the FIND function of the
Materials Library. Type the first few characters of the name of the material or any
field in the materials library in the edit box adjacent to the FIND button. Click on
the "FIND" button and it will find the first occurrence of the material that matches
the sequence of characters you have entered. Click on "FIND" again to find the next
occurrence.

Detach Materials

To detach a material from an object click on Radiance→Materials→Detach Material.
Then select the object from which you want the material detached.

This tool can be used in conjunction with the "Show all attached materials" function
making it possible to select and detach all the materials in a drawing at one time. To

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do this go to Radiance→Materials→Show All Attached Materials. When all surfaces are selected go to Radiance→Materials→Detach Material. At the prompt it will ask you to select surfaces to detach the materials from. Type the letter P for the previous selection set, all surfaces with materials will be selected and highlighted, then hit <enter>. All materials of the highlighted, selected surfaces will be detached.

Show All Attached Materials

This function selects all objects that have a material attached to them. To use this function go to Radiance→Materials→Show All Attached Materials. The surfaces with attached materials will become selected and displayed with dashed lines in the Graphic Editor window.

Show Material Properties

This function allows you to view detailed information about a specific material.

For more information on how to use the Material Properties Dialog Box (*Figure 22*) or to create new materials, see **Material Properties** or the **Library Manager**.

New Materials

New **Opaque** materials can be created and added to an user database by using the **Material Editor**.

Luminaires

Place Luminaire

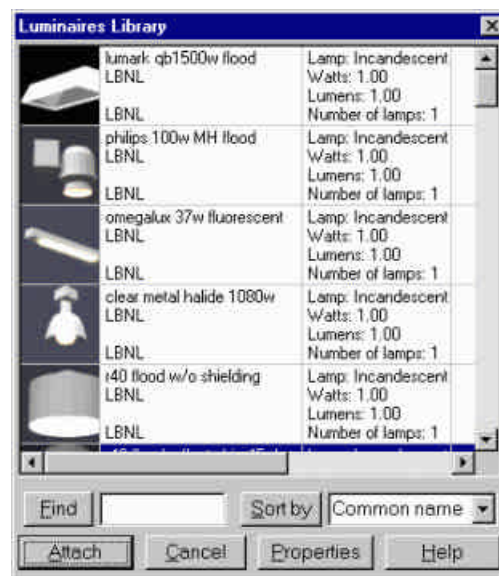The Luminaires Library dialog box shows the database of available luminaires.

Figure 4. The Luminaire Library Dialog Box

It is usually easiest if you display an axonometric view of your drawing to position the luminaire into your drawing at the correct height. Use the appropriate "snapping" method. Then in plan view you can move the luminaire to the correct horizontal position.

To access the Luminaires Library Dialog Box select Radiance→Luminaires→Place Luminaires and the Luminaires Library Dialog Box will appear *(Figure 4)*

Scroll through the list and select a luminaire to place in your drawing. Next, click the ATTACH button at the bottom of the Luminaires Library dialog box. Doing so brings back the AutoCAD window. Select an insertion point for the luminaire and then choose a rotation angle. Repeat the process for other luminaires. You can also create your own luminaires with custom IES photometry by using the **Luminaire Wizard**. You can reach the wizard through Radiance → Luminaire → New Luminaire. For more information on creating luminaires, see **New Luminaire.**

You can sort the luminaire library to make it easier to find a specific luminaire. You may sort the luminaire library by the common name of the luminaire, its manufacturer, the manufacturer's product code, the source of the data (the person or company that entered it into the database), the luminaire's lamp type, dimming level (watts), dimming level (lumens), or number of lamps. To sort the luminaires, select the desired property in the drop-down list box next to the "SORT BY" button. Then click "SORT BY". You can click again to reverse the sort order.

Alternatively, you may search for a luminaire by using the FIND function of the Luminaire Library. Type the name of the luminaire or a sequence of characters matching any other field in the luminaire library in the edit box adjacent to the FIND button. Click on the "FIND" button and it will find the first occurrence of the luminaire that matches the sequence of characters you have entered. Click on "FIND" again to find the next occurrence.

Delete Luminaire

To delete a luminaire from your drawing go to Radiance→Luminaires→Delete Luminaire. Then select the luminaire that you want deleted. The AutoCAD erase command also works.

Show Luminaire Aiming

This function allows you to see the direction that a luminaire is aimed. To use this tool, go to Radiance→Luminaires→Show Luminaire Aiming. Select a luminaire as prompted by the command line. A red arrow will appear that shows the direction that the luminaire is pointing. To change the luminaire aiming, use the standard object rotation commands of the Graphic Editor.

In AutoCAD, the best way to aim a luminaire is through a series of rotations about the Z-Axis of the user coordinate system (UCS). First rotate your UCS such that the z-axis is parallel to the axis on which you would like to rotate the luminaire, for example "UCS, X, 90" will rotate the UCS about the x-axis of the current UCS by 90 degrees. Then type the "rotate" command and select a point on the surface of the luminaire.

Show All Luminaires

This function selects all luminaires in your drawing. To access this function go to Radiance→Luminaires→Show All Luminaires. All luminaires will become selected. This tool can be used in conjunction with "Delete Luminaire" to delete all the luminaires in your drawing at one time.

Show Luminaire Properties

This function allows you to view detailed information about a specific luminaire. If you would like to "turn off the lights", you can do so by changing the percent dimming for lumens and watts to 0. 1 means 100% output (no dimming); 0 means 0% output (all dimming).

For more information on how to use the Luminaire Properties dialog box see the **Luminaire Properties** dialog box.

New Luminaire

In addition to the predefined Desktop Radiance luminaires, custom luminaires may be created through the **Luminaire Wizard**. Before creating a new luminaire, you will need to set up your drawing appropriately, create a project directory, and synchronize your drawing. To enter the Luminaire Wizard from Desktop Radiance, go to Radiance → Luminaires → New Luminaire. Then follow the steps to create your luminaire.

Glazings

Attach glazing

The Glazings Library dialog box shows the database of available glazings that can be attached to surfaces in your drawing *(Figure 5)*. The Desktop Radiance Glazing database is based on glazing data from the program **Optics5** which uses data from the National Fenestration Ratings Council, http://www.nfrc.org. For more on **Optics5**, see http://windows.lbl.gov/Materials/optics5/.
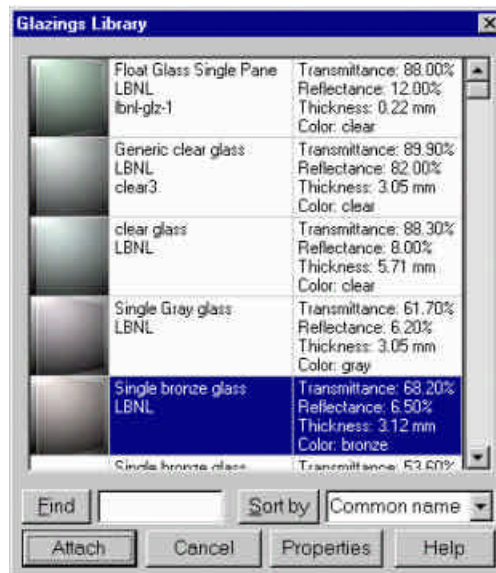

Figure 5. The Glazings Library Dialog Box

To access the Glazings Library Dialog Box go to Radiance→Glazings→Attach Glazing. The command line prompts you to select the surfaces that the glazing will be attached to. After selecting surfaces you then press <enter> (no more surfaces to select) and the Glazings Library Dialog Box will appear. Scroll through the list and

select a glazing to attach to the selected window(s) in your drawing. Next, click the ATTACH button at the bottom of the Glazings library dialog box. Doing so brings back the AutoCAD window and associates the glazing to the selected window. Repeat the process for other windows. For double paned windows, do not make two layers of glass. This will result in incorrect light calculations.

You can sort the database to make it more convenient to find a specific glazing. You may sort the glazings library by the common name of the glazing, its manufacturer, the manufacturer's product code, the source of the data (the person or company that entered it into the database), or by the reflectance, transmittance, or thickness. To sort the glazings, select the desired property in the drop-down list box next to the "SORT BY" button. Then click "SORT BY". You can click again to reverse the sort order.

Alternatively, you may search for a glazing using the FIND function of the Glazings Library Dialog Box. Type the name of the glazing or a sequence of characters matching any other field in the glazing library in the edit box adjacent to the FIND button. Click on the "FIND" button and it will find the first occurrence of the glazing that matches the sequence of characters you have entered. Click on "FIND" again to find next occurrence.

Detach Glazing

To detach a glazing from an object click on Radiance→Glazings→Detach Glazing. Then select the object from which you want the glazing detached. This tool can be used in conjunction with the "Show all attached glazings" function making it possible to select and detach all the glazings in a drawing at one time. To do this go to Radiance→Glazings→Show All Attached Glazing. When all windows are selected go to Radiance→Glazings→Detach Glazing. At the prompt it will ask you to select glazings to detach. Type the letter P for the previous selection set, all glazings will be selected and highlighted, then hit <enter>. All glazings will be detached from the highlighted, selected set

Show All Attached Glazing

This function selects all objects/surfaces that have a glazing attached to them. To use this function go to Radiance→Glazings→Show All Attached Glazings. The objects with glazings attached will become selected.

Show Glazing Properties

This function allows you to view and edit detailed information about a specific glazing.

For more on how to use the Glazing Properties dialog box see **Glazing Properties**.

New Glazing

In addition to the predefined Desktop Radiance glazings, custom glazings may be created by using the **Glazing Wizard**. You will need to have **Optics5** installed on your computer. If you do not have **Optics5** installed, you can download it from here, http://windows.lbl.gov/materials/optics5/download.htm.

Furnishings

Place Furnishing

The Furnishings Library dialog box contains the database of available furnishings that can be placed in your drawing *(Figure 6)*
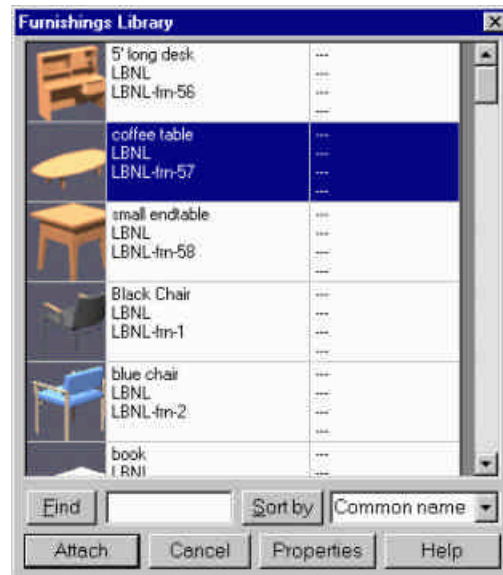

Figure 6. The Furnishings Library Dialog Box

To access the Furnishings Library Dialog Box go to Radiance→Furnishings→Place Furnishing. Scroll through the list and select a furnishing to place in your drawing. Next, click the ATTACH button at the bottom of the Furnishing library dialog box. Doing so brings back the AutoCAD window. Select an insertion point and rotation angle for the furnishing as indicated by the AutoCAD command prompt. Repeat the process for other furnishings.

You can sort the database to make it more convenient to find a specific furnishing. You may sort the furnishing library by the common name of the furnishing, its manufacturer, the manufacturer's product code, or by the source of the data (the person or company that entered it into the database). To sort the furnishings, select the desired property in the drop-down list box next to the "SORT BY" button. Then click "SORT BY". You can click again to reverse the sort order. You can move, copy and array these furnishings to create a furnishing plan suitable for the model.

Alternatively you may search for a furnishing using the FIND function of the Furnishings Library Dialog Box. Type the name of the furnishing or a sequence of characters matching any other field in the furnishing library in the edit box adjacent to the FIND button. Click on the FIND button and it will find the first occurrence of the furnishing that matches the sequence of characters you have entered. Click on FIND again to find next occurrence.

Delete Furnishing

To delete a furnishing from your drawing, click on Radiance→Furnishings→Delete Furnishing. Then select the furnishing that you want deleted. The AutoCAD erase command also deletes furnishings.

Show All Furnishings

This function selects all furnishings in your drawing. To use this function go to Radiance→Furnishings→Show All Furnishings. This tool can be used in conjunction with "Delete Furnishing" to delete all furnishings in a drawing at once.

Show Furnishing Properties

This function allows you to view and edit detailed information about a specific furnishing.

For more on how to use the Furnishing Properties dialog box see **Furnishing Properties**.

New Furnishing

New furnishing items can be created and added to the database by using the **Furnishing wizard**.

Analysis

Desktop Radiance is equipped with several tools to allow for accurate lighting analysis of buildings to fit the needs of the designer.

Define Zone

A zone is an optional component of your model.

Use of a zone is recommended when the size of the room you are simulating is less than half the size of the entire building model. The zone is used by Radiance to adjust certain calculation parameters to ensure an accurate simulation. A zone would be useful, for instance, if you want to concentrate on a cubicle in an office building. Use the Define Zone function to create a 3-dimensional box for the simulation to focus on.

To define a zone, go to Radiance→Analysis→Define Zone. The Zone Dialog Box will appear *(Figure 7)*
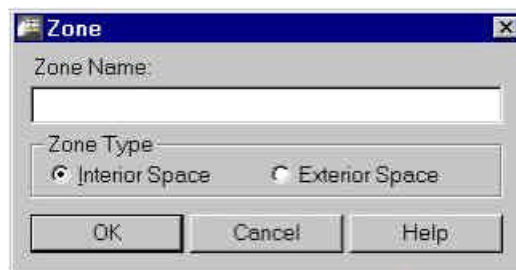
Figure 7. The Zone Dialog Box

Type in a name for the zone being created and select interior or exterior space. An interior zone means that simulations will be from an enclosed interior space. An exterior zone means the simulation is from the outside. If no zone is defined, the default will be an interior zone the size of the scene bounding cube of the model.

Define Orientation

This function allows you to define the direction of the north arrow of your model.

To use this tool, go to Radiance→Analysis→Define Orientation (*Figure 8*).

Figure 8. The Define Orientation dialog box

Enter a name for the North Arrow in the dialog box then click OK to return to the drawing. Pick an insertion point and a rotation angle. The "Define Orientation" function is best used in the plan view.

Note: The North Arrow icon may appear too large or too small if the units have not been set up for your drawing. For more on how to adjust this see **Preferences**.

Figure 9. The AutoCAD North Arrow

Multiple north arrows are possible in one drawing to allow for parametric studies.

The default orientation, if none is defined, is with north pointing up and West to the right, in plan view. You can select North arrow for your simulation in the Advanced Dialog box.

Define camera position

The define camera position function allows you to create and position a new camera. To use this tool, go to Radiance→Analysis→Define Camera Position. The Camera Properties Dialog Box then appears *(Figure 10)*.

Note: ELEVATION is defined by AutoCAD as "The default Z value above or below the *XY* plane of the current user coordinate system…", and CURRENT ELEVATION is "the *Z* value that is used whenever a 3D point is exptect but only *X* and *Y* values are supplied."
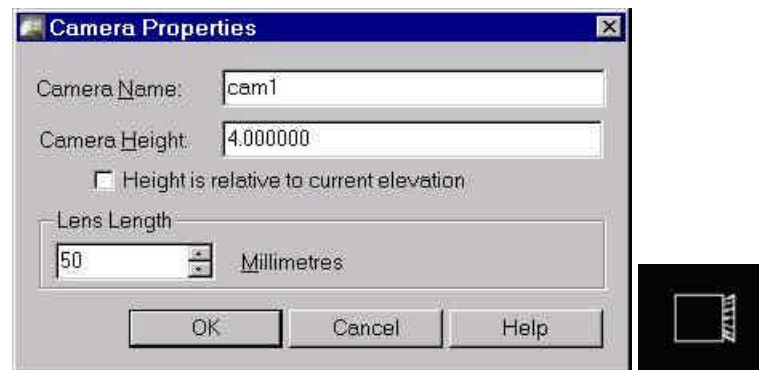

Figure 10. The Camera Properties Dialog Box and the camera icon

Enter a name for the camera and set its height. Check the "Height is relative to current elevation" box if you would like the camera's height to be incremented by the current ACAD system "elevation" setting. Then set the lens length. The lens length determines how long the zoom lens is. Smaller numbers make the lens shorter and therefore give a wider, farther away view. Conversely, larger numbers make the lens longer and will therefore give a narrower, closer view. After clicking OK you are brought back to the Graphic Editor window and prompted to give an insertion point, a rotation angle, and the height above the insertion point for the origin of the camera's view. If you enter a camera name that has already been used in the project, scenarios which use this camera will be changed to the new view parameters. The camera icon will then appear in your drawing at the insertion point. If the icon is either too small or too large, this can be adjusted in the preferences dialog box which can be accessed through the Radiance pulldown menu. For more on this, see **Preferences**.

To change the view of a camera first type **view¿ r¿** and then type the name of the camera↵. The view of the camera will then appear with an outline representing the camera lens. Type **dview¿**. Several commands will appear at the command prompt that allow you to adjust your viewpoint in different ways. Consult the AutoCAD help section for detailed information on using these commands. Typically the Target and Zoom commands are very useful. Zoom allows you to zoom forwards and back. Target allows you to move your viewpoint target in all directions. Using these tools is difficult because your wireframe scene disappears while you make adjustments. After editing your camera view, hit enter at the dview prompt. Your new view will appear in wireframe. If you are satisfied with the view, you must save it with the ddview command. If you are unsatisfied with the new view you must return to the original view you started editing and then begin using the dview commands again. Once you are satisfied with the new view, type **ddview¿ ,** to save the new view. Click on New and then enter the same name as the camera view that you were originally editing. Entering the same name will allow you to select the original camera icon when starting a simulation, but with the updated view. Entering a new name will mean that you have to select the view name in the camera simulation setup dialog box because there won't be a picture of a camera representing your new view.

In addition to the camera views represented by camera icons, you can also render the "current view".

The camera view can also be changed more easily and quickly in the *winrview* program when you start a simulation. This is useful for checking your geometry or to find an ideal view. Custom views can be saved for later use as described in the File→Append View to rif file and File → Append View to view file sections of the Interactive Rendering chapter.

Define Animation Path

Calculation of an Animation Path is not yet available on version 2.0 BETA of Desktop Radiance. However, you can set up camera paths that will create individual cameras for single frame renderings. The animation path is created as a polyline (pline) and smoothed (splined) automatically after you right-click the mouse to terminate. Each click on the screen is equal to a vertex of the pline, not a camera position, so the number of clicks can be different than the number of cameras you want for the scene.
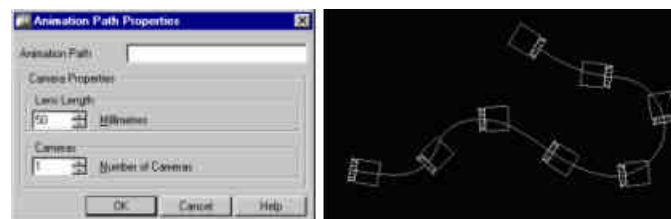
Figure 11. The Animation Path Properties Dialog Box and an animation path

Define Reference Point

Use the Define Reference Point function to place a light sensor at one specific point *(Figure 12)*. The sensor is used to measure **illuminance** which is how much light is reaching that point from all directions. To use this tool, go to Radiance→Analysis→Define Reference Point. You are then prompted to enter a name for the reference point (which needs to be unique in the drawing) and a height.

You should be aware of your drawing's current elevation and enter a height that is appropriate.

Figure 12. The Reference Point Properties dialog box

After clicking OK, you will return to the drawing and be ready to place the sensor reference point *(Figure 13)*.

Figure 13. A Reference Point Sensor

Define Reference Grid
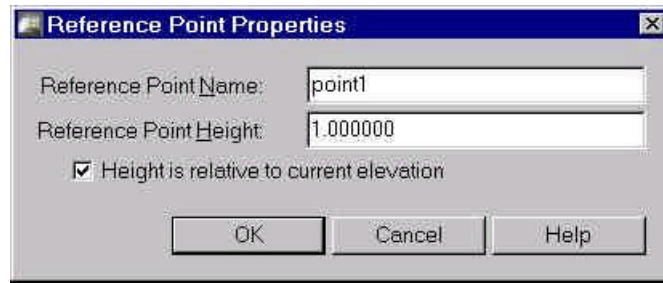
Use Define Reference Grid to create a plane within the model where **illuminance** values can be measured. To define a reference grid go to Radiance→Analysis→Define Reference Grid *(Figure 14)*.
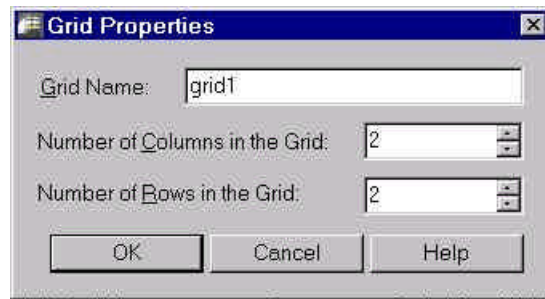
Figure 14. Grid Properties Dialog Box

Enter a name for the reference grid and the number of columns and rows for the illuminance grid, then click OK to return to your drawing. Then click in your drawing to select the opposing corners of the grid. If you are in a perspective view when defining the corners of the grid, the box being defined will not appear to fit the plane in perspective until after you have selected both corners.

The reference grid can be moved to the correct height and position by using standard graphic editor commands if necessary.

Note: Reference points and grids should be positioned above any occluding surfaces. This means that the height of the points and grids should be a fraction of a unit larger than the surface's height.
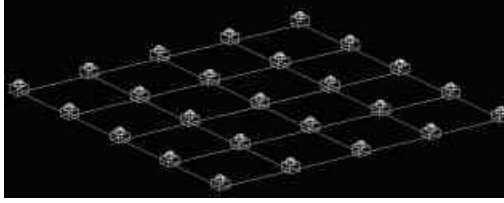
Figure 15. A Reference Grid of Sensors

Vertical and slopped grids are possible by changing the **UCS** of the drawing before inserting, or by rotating the grids after inserting (*Figure 16*). For more information on how to change the **UCS** in your drawing, please consult the AutoCAD Command Reference.

Figure 16. Example of sloped and vertical reference grids

Show All Analysis

This command will highlight all the cameras, reference points and grids, and animation paths in your scene.

Simulation

The simulation process can begin when all the Radiance attachments and settings are ready to create a picture or calculate a point or grid quantity of your model. This process begins by selecting a camera, reference point, or reference grid to simulate. Then the scenario or simulation needs to be named and you choose the location, date, and time that the scenario should portray. These parameters then become part of a single scenario.

When a simulation is done, it can be viewed first in the **Interactive Rendering***(rview)* and then in the **Image Analyzer**.
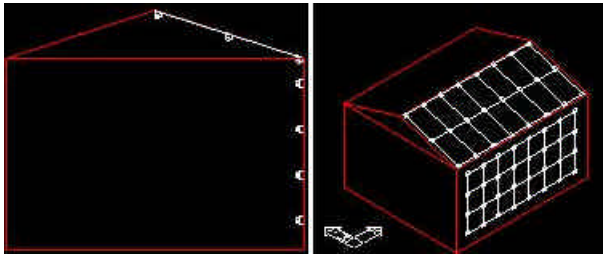
Camera

This function allows you to begin a Radiance simulation of your drawing.

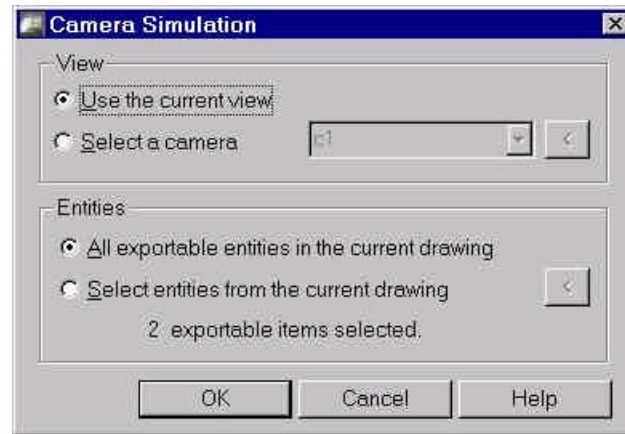To access the Camera Simulation dialog box, go to Radiance→Simulation→Camera *(Figure 17)*.

Figure 17. Camera Simulation Dialog Box.

Here you can select to either render the current view (whatever you see in the ACAD screen, this could mean looking through a camera, at an axonometric view, at a plan view…) or to select a camera in your drawing. If you chose to select a camera, use either the drag down menu to locate the name of your camera or click on the < button to return to the drawing to manually select a camera.

Here you can also specify what geometry to export. If you want to export all entities in the current drawing, select the first option. If you want to manually select the geometry, click the second radio button and then the < button to return ot the ACAD screen.

After entering a name and clicking OK, the command line prompts you to "select objects". These will be the objects included in the simulation. If you want all objects included, type "all". Otherwise, select in your drawing the objects to include and press enter. For more on defining scenarios see **Define Scenario**.

In some cases a dialog box with the heading Define Project may appear. For information on this see **Project Folder**.

The computer will then synchronize the database and the Camera Simulation Setup Dialog Box will appear *(Figure 18)*. Synchronizing can sometimes take several

minutes to complete for large models as the selected library items are copied to your project directory. For more on simulating your model see Simulation Manager.
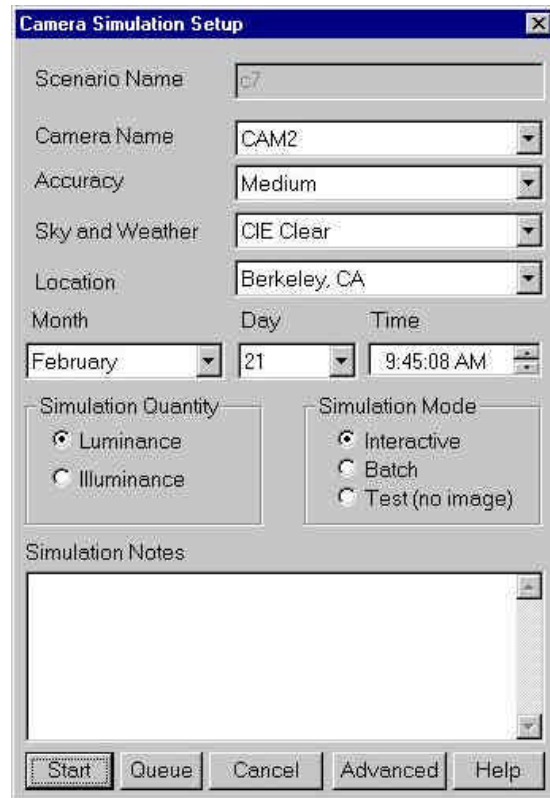
Figure 18. The Camera Simulation Setup Dialog Box.

Reference Point
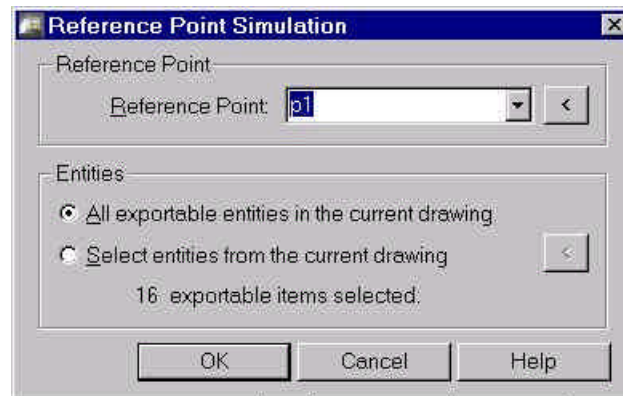
Figure 19. The Reference Point Simulation Dialog Box

This tool runs a simulation of a light sensor (reference point) in your model. It produces an illuminance value at the sensor for the scenario you have defined. To use this tool, go to Radiance→Simulation→Reference Point.

To place a sensor see **Define Reference Point**.

Reference Grid
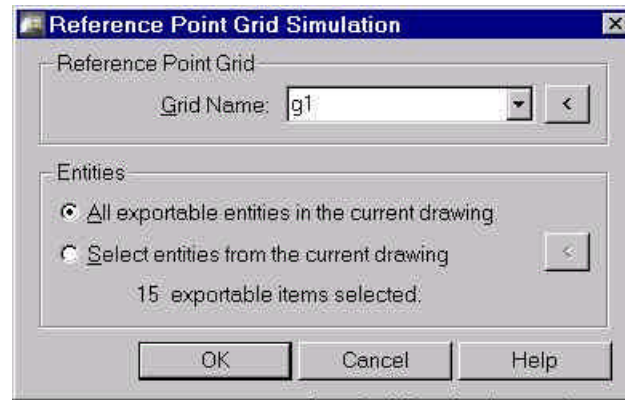
Figure 20. The Reference Point Grid

This tool runs a simulation of a grid of light sensors in your model. It produces an array of illuminance values for the sensors in the scenario you have defined. To use this tool go to Radiance→Simulation→Reference Grid.

To define a reference grid see **Define Reference Grid.**

Project

Project Folder
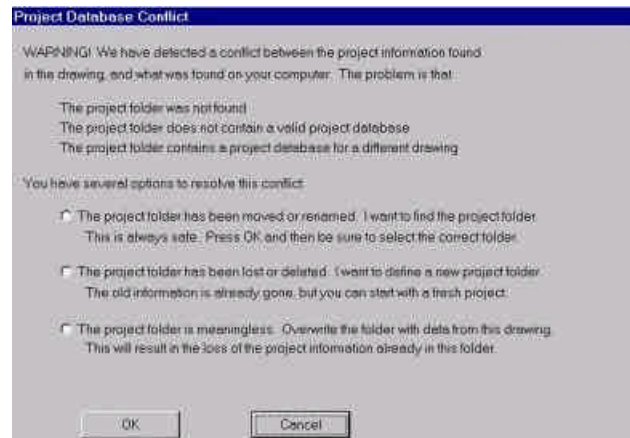
Figure 21. The Project Database Conflict Dialog box

Synchronize Project

More text go here.

Duplicate Project

More text go here.

Tools

The Radiance tools menu items consist of utilities that assist in the management of your drawing model and the corresponding Radiance project files.

Show All Attachments

This function highlights and selects all luminaires, furnishings, and surfaces with materials or glazings attached to them. To access this tool go to Radiance→Tools→Show All Attachments. All Radiance attachments will become highlighted. The AutoCAD "previous" command can be used within a subsequent command to act upon these objects. .

Show All Unattached

This function selects and highlights all the objects and surfaces in the drawing that do not have a material or glazing attached to them. To use this tool go to Radiance→Tools→Show All Unattached. Objects and surfaces without Radiance attachments will become highlighted. The AutoCAD "previous" command can be used within a subsequent command to act upon these objects.

Show Properties

This function allows you to view specific properties of Radiance elements including Furnishings, Materials, Glazings, and Luminaires, reference points, grids, cameras, and arrows.

To access this function, go to Radiance→Tools→Show Properties. Then select a material, glazing, furnishing, or luminaire in your drawing.

Material Properties

To access the Material Properties dialog box *(Figure 22)* go to Radiance→Tools→Show Properties and then select a material in your drawing.

Figure 22. The Material Properties Dialog Box.

When attaching a new material, the Material Properties dialog can also be accessed by clicking on the PROPERTIES button at the bottom of the Materials Library dialog box.

You can change certain properties (comments) of a material in the Material Properties dialog box. This is done by adding inputs and clicking apply.

To create new materials you can go through either the Material Properties Dialog Box or through the Library Browser (see **Library Manager**).

Furnishing Properties

To access the Furnishing Properties dialog box *(Figure 23)* go to Radiance→Tools→Show Properties and then select a furnishing in your drawing.
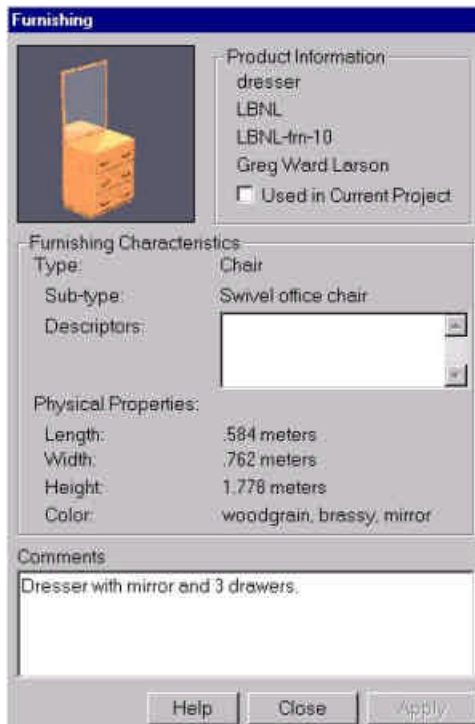
Figure 23. The Furnishing Properties Dialog Box.

The Furnishing Properties dialog can be accessed from the Furnishings Library dialog box when placing a new furnishing or from the Library Browser. In the Furnishings Library dialog box highlight a furnishing and click on the PROPERTIES button.

Glazing Properties

To access the Glazing Properties dialog box *(Figure 24)* go to Radiance→Tools→Show Properties and then select a glazing in your drawing.

Figure 24. The Glazing Properties Dialog Box.

The Glazing Properties dialog can be accessed from the Glazing Library dialog box when placing a new glazing. In the Glazing Library dialog box, select a glazing and click on the PROPERTIES button at the bottom of the Glazing Library dialog box.

The Simulation Control check box allows you to turn on and off the window "as a light source". If the box is checked, the mkillum command will be executed when a simulation (rad, rpict or rview) begins. Mkillum calculates the distribution of light from windows or skylights, taking into account external obstructions and inter-reflections. If the box is unchecked, mkillum will not run when the simulation, interactive or batch, is started, and the simulation will have to calculate (trace rays to the outside) the contribution itself. For more information on this subject, see **mkillum** in the Radiance Reference Manual, http://radsite.lbl.gov/radiance/man_html/mkillum.1.html.

You can change certain properties (comments) of a glazing in the Glazing Properties dialog box. This is done by adding inputs and clicking apply.

Luminaire Properties

To access the Luminaire Properties dialog box *(Figure 25)* go to Radiance→Tools→Show Properties and then select a luminaire in your drawing.
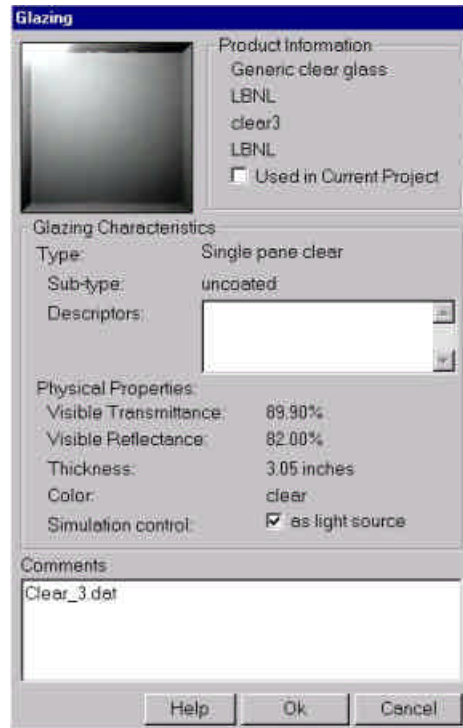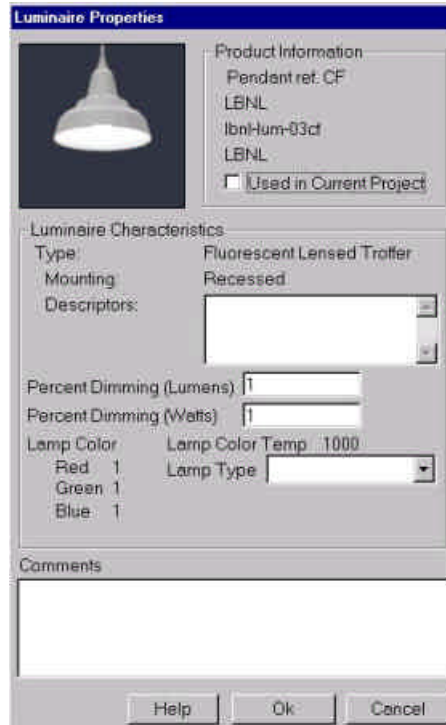
Figure 25. The Luminaire Properties Dialog Box.

When placing a new luminaire, the Luminaire Properties dialog can be accessed by clicking on the PROPERTIES button at the bottom of the Luminaire Library dialog box.

Detach All

This function detaches all materials, glazings, furnishings, and luminaires from objects and surfaces in the model.

To use this tool go to Radiance→Tools→Detach All. All objects with Radiance attachments will be selected automatically and a window appears to confirm that you want to detach all Radiance materials and glazings. This restores your drawing to the state it was in before the use of any Desktop Radiance commands.

Note: Detach all should be used with caution. Save your drawing and/or make a backup drawing before using this command because all of your work may be lost. Detach all is sometimes useful to debug problems you may be having with your drawing.

Adjust Surface Normals

This command is used to check and adjust the orientation of surfaces in your model. In general, the orientation of surfaces is not important for Radiance as it is with other lighting analysis tools. However, to calculate the distribution of daylight with glazings to be treated as a "light source", it is necessary to have the glazing surface correctly oriented. Material surfaces do not need correct surface normal orientation. To use this function, go to Radiance→Tools→Adjust Surface Normals. Then, as you are prompted, select the glazing surface in your drawing. A red arrow will appear within the window *(Figure 26)*.
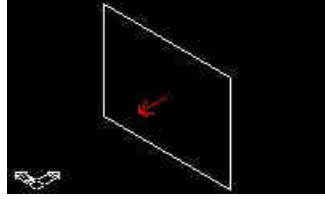
Figure 26. A surface with the Adjust Surface Normal *arrow showing orientation*

A correctly oriented surface normal for a window or skylight should be pointing in the direction of daylight travel from brightest to dimmest regions. The command line asks you if you want to flip the surface normal. Type "N" if the arrow is pointing in the correct direction and "Y" if you want to switch it. If the direction of the surface normal is not as you expected and cannot be reversed with this tool, then the window surface needs to be recreated. Certain ACAD entities, ie region and body, have surface normals that are intrinsic to the object itself and therefore cannot be altered with this tool. Those need to be recreated if they are to be correctly oriented as glazing surfaces.

If the red surface normal arrow does not appear it may be that you are checking an object that Desktop Radiance can't figure the front or back of, for example an exploded ACIS solid. The surfaces of an exploded ACIS solid will have normals pointing outwards. If the surface normal you are checking is not that of a surface of an exploded ACIS object and you don't see the red surface normal arrow, see **Preferences**.

If you would like to create your glazing surfaces with the proper orientation when you first draw them, use the **Right Hand Rule.**. Imagine placing your right hand against the wall with the window, with your thumb pointing in the direction that the light travels. Your four fingers now curl in the direction that the vertices should be created to obtain a properly oriented surface.

Material Map

The Material Map function associates a surface with a specific layer or line color in your graphic editor program or the specified Desktop Radiance material. To use the material map tool go to Radiance→Tools→Material Map and then the Material Map dialog box will appear *(Figure 27)*.

Figure 27. The Material Map Dialog Box

To attach a material to all surfaces in a particular layer, click on ADD LAYER. The Material Layer Assignment Dialog Box will appear *(Figure 28)*.
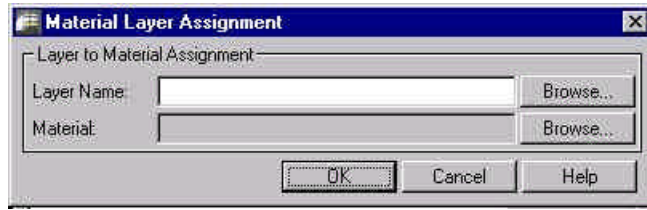
Figure 28. The Material Layer Assignment Dialog Box

Click on layer name→BROWSE to select a layer, from the Current Drawing Layers Dialog Box (*Figure 29*) that the material will be associated with.
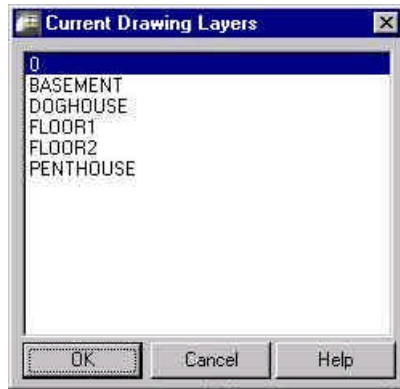
Figure 29. The Current Drawing Layers Dialog Box

Then click on material→BROWSE and select a material to be associated with the layer.

To attach a material to all surfaces with a particular color, go to Radiance→Tools→Material Map to get to the Material Map Dialog Box *(Figure 27)*. Click on ADD COLOR.
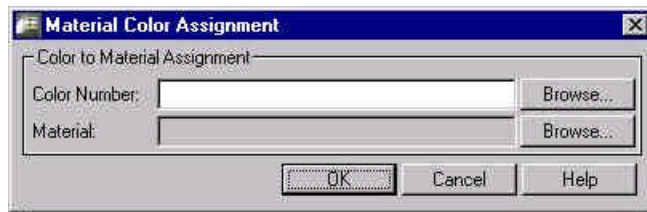
Figure 30. The Material Color Assignment Dialog Box

In the Material Color Assignment Dialog Box that will appear next *(Figure 28)*, enter either the color number or click on color number→BROWSE to find the correct color. After finding a color click on material→BROWSE to find the material to be associated with the color.

After associating a layer or color with a material through the Material Map tool, new objects created in that layer or color are not automatically associated with the material. The layer or color must be re-associated with the material for all new objects of that layer or color to be included.

NOTE: As of Version 1.02, the only name allowed for saving a map file is **savemap.lcm**. Any unique name you input will be ignored and the default **savemap.lcm** name used.

Library Manager

This tool allows you to easily keep track of all available Radiance libraries, these include Furnishings, Glazings, Materials, and Luminaires (see **Library Manager**).

Future Plans for the Library Manager:

The Library Manager is still rapidly changing and developing.

Material Editor

This tool allows you to edit existing materials and create new materials altogether. For information on using the Material Editor see **Material Editor**.

Simulation Manager

The simulation manager keeps track of your simulation scenarios. This menu item allows you to launch "SimMan" *(Figure 31)* without starting a simulation.
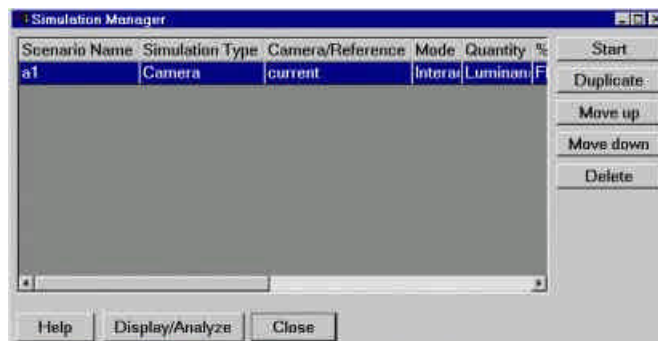
Figure 31. The simulation Manager window

For more information on using this tool (see **Simulation Manager**).

Image Analyzer

The Image Analyzer allows you to further analyze the lighting performance of your model. For more information (see **Image Analyzer**).

Preferences

The General Preferences Dialog Box *(Figure 32)* is used to set the units (metric or imperial), unit size (meters, inches, etc.) of a drawing, and drawing "scale" for appropriate sizing of the Desktop Radiance library items. To use this tool go to Radiance→Preferences. There is an important relationship between the settings here and the units format of your graphic editor program. The most important relationship is that if the units display in your graphic editor are "Architectural", then you will want to choose "Imperial" and "Inches" in the Desktop Radiance General Preferences Dialog Box. See the note on **Setting Up A Drawing** for more explanation.

Figure 32. General Preferences Dialog Box

Sometimes when attaching or inserting a Radiance entity into your drawing, it will appear much smaller or much larger than you want it to be. This includes objects such as **cameras**, **north arrows**, **Reference Points, Reference Grids,** and **surface normal arrows**. To fix this problem use the General Preferences tab dialog box. Before attaching the Radiance entity into your drawing, change the **Drawing Scale** value. To make an object larger, make the symbol scale value larger. To make an object smaller, make the symbol scale value smaller. For example, changing the value from 1 to 10 would make the object ten times as big as before. Whereas, to make an object smaller, changing the value from 1 to 0.1 would make the object one tenth as big as it was before. After changing the symbol scale value, then attach or insert the Radiance entity to your drawing.

Note: One way to understand the use of the drawing scale is to imagine the actual size of the photosensor (in real life) in relation to the size of its surrounding objects. If a 2"x2"x1" photosensor is put on top of a table in real life, the objects will both be visible. The photosensor will *seem* of the right scale relative to the table in this case if the drawing scale ratio is 1:1.

Likewise, if a 2"x2"x1" photosensor is placed on a big object in real life, for example in the middle of the Golden Gate Bridge (1.7 miles long), you will have a hard time seeing the photosensor unless you are standing very close to it at 1:1. If you want to see the photosensor and the whole bridge at the same time, the drawing scale needs to be changed to 1:*bigger number* because the size of the photosensor needs to be made *bigger* relative to the bridge.

The Desktop Radiance Export Preferences Dialog *(Figure 33)* determines which entity types will be exported from your graphic editor for the simulation.
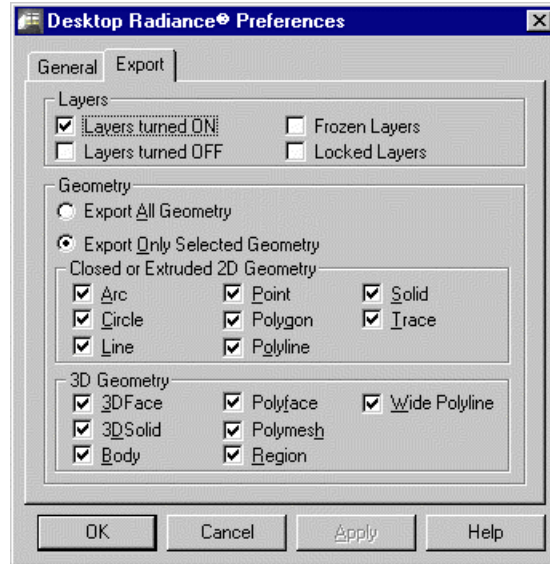
Figure 33. The Export Preferences Dialog Box

The layer options allow you to modify which entities of your drawing will be included in the simulation. They refer to the various layer settings in your Graphic Editor program. The Geometry option determines whether you want all geometry to be exported automatically for simulations or if you want to select particular Geometry yourself. Closed or Extruded 2D Geometry and 3D Geometry refer to types of geometry that can be included in simulations.

Library Manager

Introduction

The Library Manager is a collection of tools related to the maintenance of the Desktop Radiance Material, Luminaire, Glazing, and Furnishing libraries. This Library Browser allows you to view detailed information about Radiance Furnishings, Glazings, Luminaires, and Materials. The Editor and wizards allows you to create new Desktop Radiance materials, glazings, luminaires and furnishings.

All items added to the libraries are accessible to any user of Desktop Radiance or users who share the same main database.

To reach the Library Browser from inside the Graphic Editor, go to Radiance → Tools → Library Manager. Select the appropriate tab for Furnishings, Glazings, Luminaires, or Materials.

The current state of the Library Browser does not include all future functionality. Future version will have the ability to edit specific library items and to move items betweendifferent installations of Desktop Radiance.

Material Library Browser

The Material Library Browser *(figure 1)* allows you to view all of the available materials and their properties. You can browse for items in the Material Library by scrolling through the list. When an item has been highlighted the properties can be viewed by clicking the PROPERTIES button. You can search the material library by keyword using the "Find" button. Type the common name or a fragment of the common name in the white box next to the FIND button. Then click on the FIND button. It will find the first occurrence of the item. Click on FIND again to find the next occurrence. You can sort the displayed items alphabetically by clicking on the heading name for each column of the table.
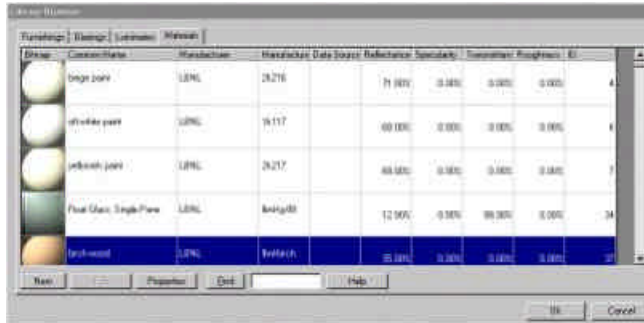
Figure 34. The Material Library Browser

Material Editor

In addition to the predefined Desktop Radiance materials, custom materials may be created in the Material Editor. Currently only reflective materials can be created. It is also not yet possible to "edit" existing materials in the library. To enter the Material Editor *(figure 1)* from Desktop Radiance, go to Radiance → Materials → New Material *(figure 2)* Material Editor may also be opened by choosing its icon (created by the install program) from the Start Menu in the Desktop Radiance directory.. From in the Material Library Browser, click on the NEW button and enter a new material name when prompted. For every custom material that you create, the Material Editor needs to know the Material Type, Red, Green, and Blue values and Specularity and Roughness values. You may optionally specify information about the manufacturer of this material from the "manufacturer" button.

Figure 35. Material Editor

Material Type

To set material type, use the pull down menu located below the Material Name field. Currently only plastic and metal may be created. Plast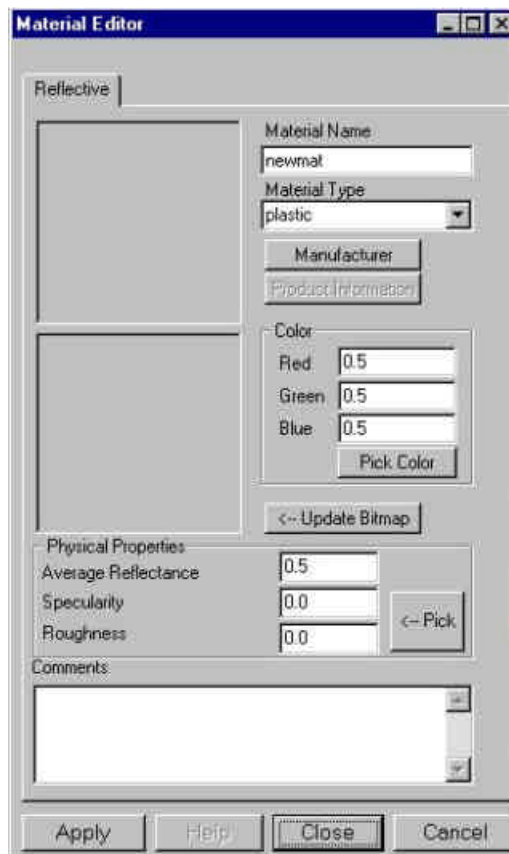ic materials include all opaque materials that have colored diffuse reflections but uncolored specular (shiny) components. Plastic materials include formica, tile, glossy paint, and any similar surfaces. Materials that have colored specular highlights are appropriately modeled as "metal". Metal materials include bronze, gold, copper, aluminum, and similar surfaces. (More on this in **Physical Properties**)

Manufacturer

Next, if applicable, click on the MANUFACTURER button to bring up the Manufacturer Contact Information Dialog box *(figure 3)*. This information is optional. To save manufacturer information and return to Material Editor, click on APPLY. You man specify a new manufacturer by selecting "NEW" from the pop-up list of manufacturers.
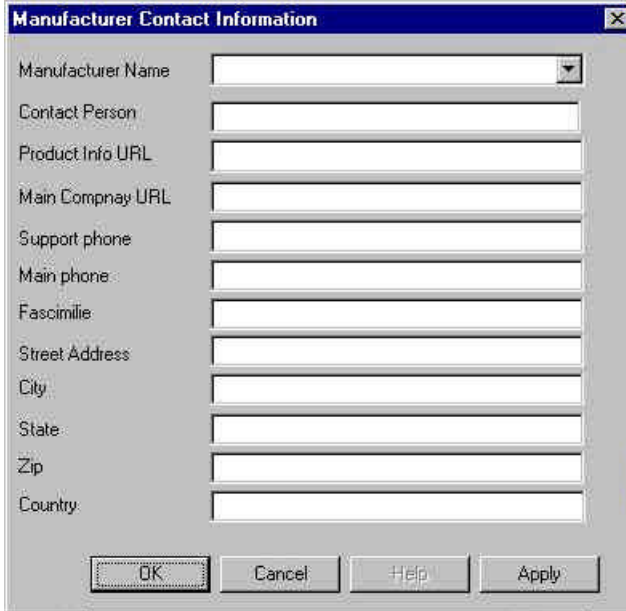
Figure 36. Manufacturer Contact Information dialog box

Color

The range of values for Red, Green, and Blue is generally between zero and one, with 0.0 being the perfect absorber (black) and 1.0 being the perfect reflector (white). Radiance RGB values are not comparable to other RGB formats because the Radiance RGB values specify both the color and the reflectance. The RGB may be thought of as a three-point sample of the radiometric spectral content of the material. While it is physically possible to have one of the components greater than one (such as fluorescent materials) the reflective average should not be allowed to exceed 1.0. (see Physical Properties, below). Click the "Pick Color" button to display the standard windows color palette *(figure 4)*. Click "Define Custom Colors" to display the HSV color picker. This standard color picker may be used to approximate the color of your surface. Click "add" to add this color to your palette.

Select this color on the left-hand side of the color picker and then click OK. The RGB and average reflectance of the color you have created will then be displayed. If the average reflectance is incorrect, the value may be changed and the resulting RGB values will be updated.

Figure 37. Color Picker

Physical Properties

The Average Reflectance displays the total, hemispherical average photopic reflectance. A plastic *(figure 5)* or metal *(figure 6)* "swatch" will appear, depending on the selected Material Type, to help you find the desired specularity and roughness combination. The reasonable range for specularity is between zero and .07, with 0.0 being a matte surface and .07 being satin (shiny). For roughness, the reasonable range is between 0.0 and 0.2, with 0.0 being polished and 0.2 a low gloss. Both of these parameters may be selected from the "Pick" button adjacent to the Specularity and Roughness values. Select the sphere which most closely resembles your material and click Ok. The selected Specularity and Roughness values will be displayed in the Material Editor dialog box.

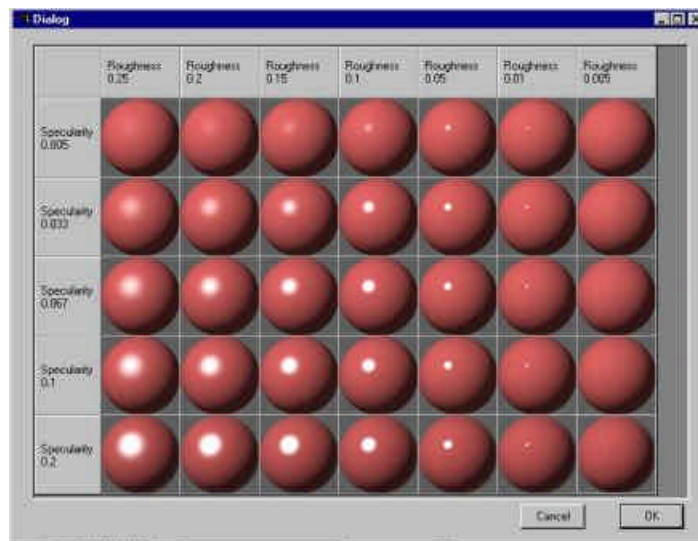

Figure 38. Plastic specularity and roughness samples
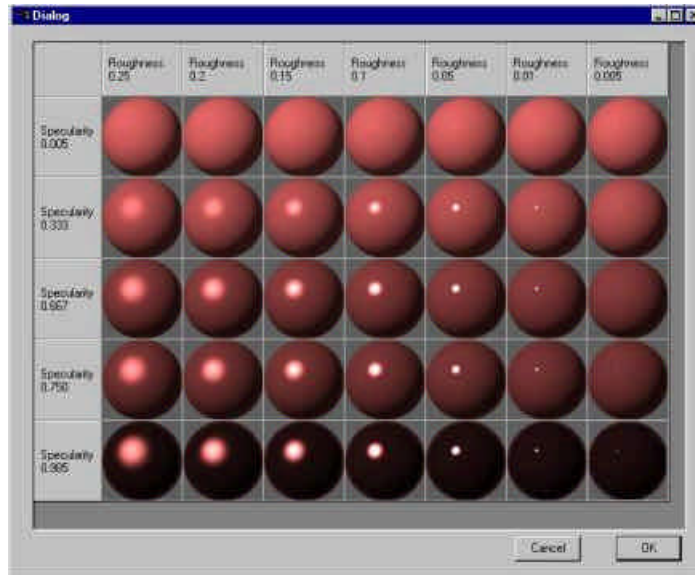
Figure 39. Metal specularity and roughness samples

After the Red, Green, Blue, Specularity, and Roughness of the new material is defined, click on the UPDATE BITMAP button to begin creating the bitmap. The Editor will render the image in the background and display it when finished *(figure 7)*. This usually takes less than one minute.
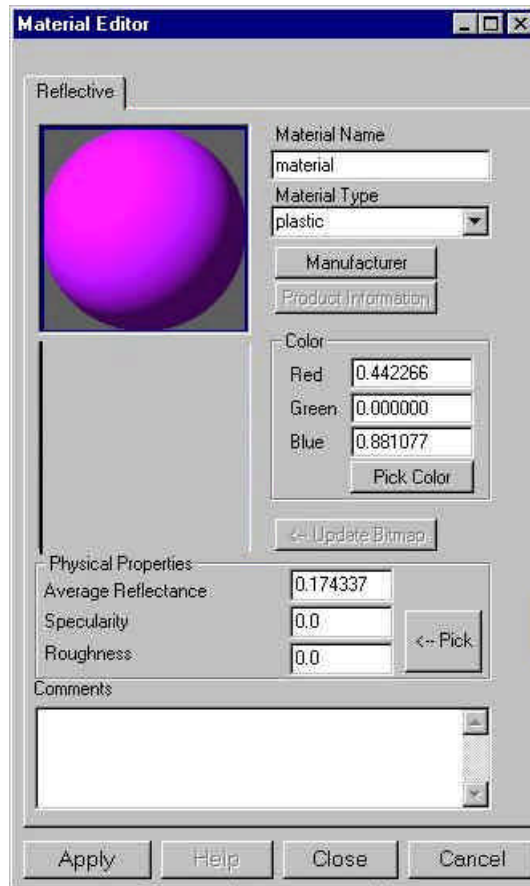
Figure 40. A new material type displayed

You may display two bitmaps at once to compare them side by side. The newer material will appear in the lower window. Either one may be selected to display its properties. When you are satisfied with the new material, click APPLY to save the selected material into the database.

Note: The Library Manager window may need to be closed (for the bitmaps to refresh) before the new material will be visible.

Glazing Library Browser

The Glazing Library Browser *(figure 8)* allows you to view all the available glazings and their properties. You can browse for glazings in the Glazing Library by scrolling through the list. When an item has been highlighted the properties can be viewed by clicking the PROPERTIES button. You can search the glazing library by keyword using the "Find" button. Type the common name or a fragment of the common name in the white box next to the FIND button. Then click on the FIND button. It will find the first occurrence of the item. Click on FIND again to find the next occurrence. You can sort the displayed items alphabetically by clicking on the heading name for each column of the table.

Figure 41. The Glazing Library Browser

Glazing Editor (Glazing Wizard)

In addition to the predefined Desktop Radiance glazings, you can create custom glazings using the Glazing Wizard. The Glazing Wizard guides you through the steps necessary to create a new glazing and add it to the Glazing Library. The wizard relies upon the Lawrence Berkeley National Laboratory program called *Optics5* included with this version of Desktop Radiance. Optics 5 *(figure 10)*, uses optical data from the National Fenestration Rating Council (NFRC) spectral data 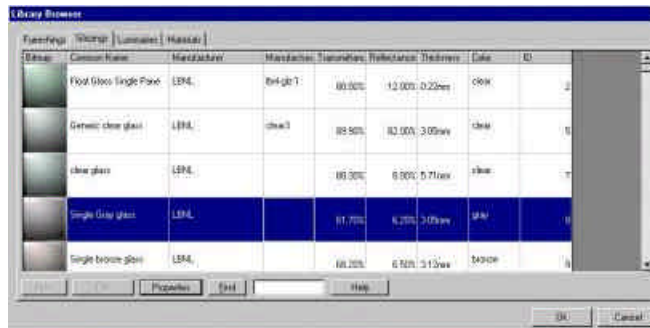library and allows you to create a Radiance description of a multi-layered glazing assembly. To enter the Glazing Editor from Desktop Radiance, go to Radiance → Glazings → New Glazing. Or select the Glazings tab of the Library Manager and click NEW. At this point you will see the "*Welcome to the Desktop Radiance Glazing Wizard*" screen *(figure 9)*.

Figure 42 The "Welcome to the Desktop Radiance Glazing Wizard" screen.

"Welcome to the Desktop Radiance Glazing Wizard"

If you have already completed the modeling of your glazing with Optics5 and have saved it as a Radiance glazing file, you can click on the "next" button in the Glazing Wizard welcome page (the page currently open), and you will be lead to the "Select the drawing and project folder" screen. Otherwise, select the checkbox to be given assistance on how to work with the Optics5 program to model the glazing you need, beginning from "How to model a glazing and prepare it for the Desktop Radiance Library".

"How to model a glazing and prepare it for the Desktop Radiance Library"

The Wizard has started the Optics5 program and should now be running as a separate application. Check your taskbar if it does not immediately appear. .
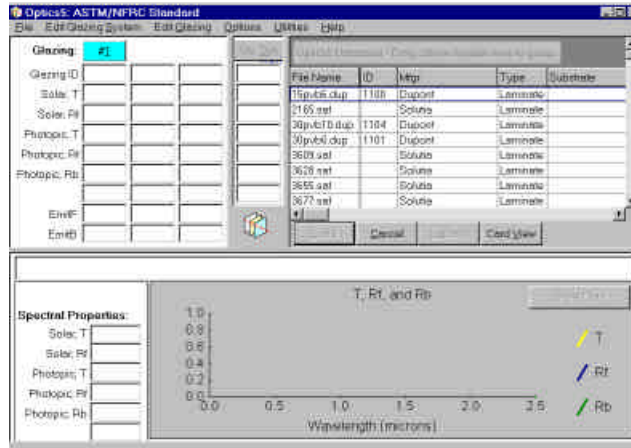
Figure 43 Initial Optics 5 screen

Overview of the Optics5 User Interface

Optics5 has four main regions that allow you to model and analyze a glazing assembly.   The upper left region shows a tabular representation of the layers of glass that comprise your glazing assembly. Each column represents a separate piece of glass and is labeled at the top with #1, #2, etc.. Adjacent to these numbered columns is a region labeled "Glz. Sys." That shows the spectral properties of the entire glazing system (all glass layers combined). When you first launch Optics5, the upper right region (as seen in *Figure 43)* shows a tabular view of the glass products database, one row for each possible manufacturer's product. The lower region shows the spectral properties of the selected layer or system on the left and a plot of the spectral transmittance and reflectance (front and back) of the selected layer or glazing system. A glazing layer is selected by clicking on the corresponding column heading (#1, #2, etc., or "Glz. Sys.").

Figure 44. Optics 5 Screen with a selected glazing

- After double-clicking and highlighting a particular glazing, the table in the upper left corner of the Optics window will show each glazing layer from outside (left) to inside (right). Glazing layer #1 is the outermost layer.

- Select a particular layer to edit by clicking in the "Glazing ID" column heading *(figure 11)*.

- Select the specific manufacturer's product to view its properties in the lower region of the dialog. Double-click on a glazing product to assign the specific glass product to the selected layer.

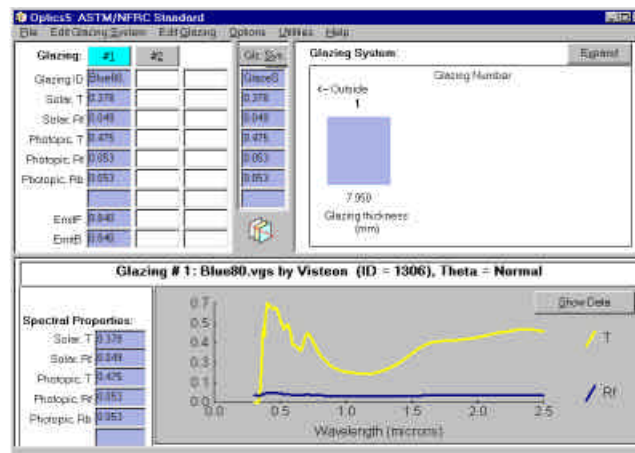- Repeat this process for the subsequent layers of your glazing assembly, if any.

- Use "File → Create Radiance file..." to save the glazing as a Radiance input file with a .RAD extension. Select a convenient directory to save this file so you can refer to it in a later wizard screen. When the glazing file is saved, click "Next" to continue to the next glazing wizard screen.

If you need more help with Optics5, please refer to the Optics5 help menu.

"Select the drawing and project folder"

At this point we assume that you have already modeled the new glazing and have the Optics5 Radiance file ready. If not, please click the "back" button to be guided through this process (see above).

Figure 45. The "Select the Drawing and Project Folder" screen.

- In the box next to "Glazing Name", specify the glazing .RAD file name, or click "Browse…" to search for it using the standard open file dialog box *(figure 12)*.

"Describe new glazing"

- The glazing manufacturer, model name or number, and item description will help you identify this glazing item in the library browser. If the manufacturer name is not included in the list, you can click the "New Manufacturer..." button to define a new manufacturer name.

- Provide the information specified and click "Next" to continue *(figure 13)*.
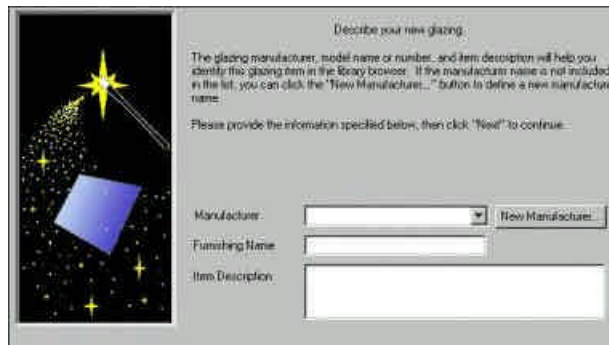
Figure 46. The "Describe New Glazing" screen.

"New Glazing Preview"

Click the preview button on the New Glazing Preview screen *(figure 14)* to inspect your new glazing item before committing it to the library, and to create a preview image for the browser. To create the preview image, use the File → Save as... command of **Winrview** to save the image. **The default name *oct_V1.pic* needs to be changed to reflect the actual name of your item** (Figure 47) **and** (Figure 48) . In this example, the drawing name is testglzwiz1 so the image name has to be testglzwiz1.pic.
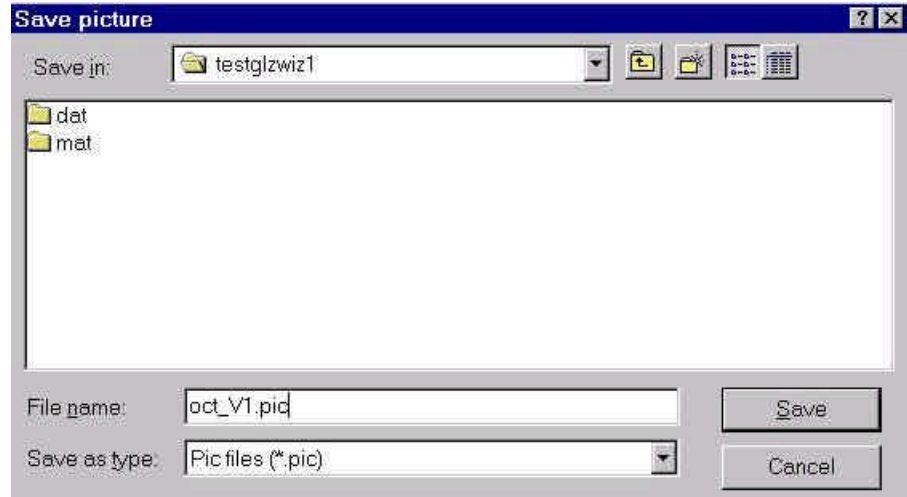
Figure 47. The Save Picture Dialog box of the Glazing Wizard with default *file name*
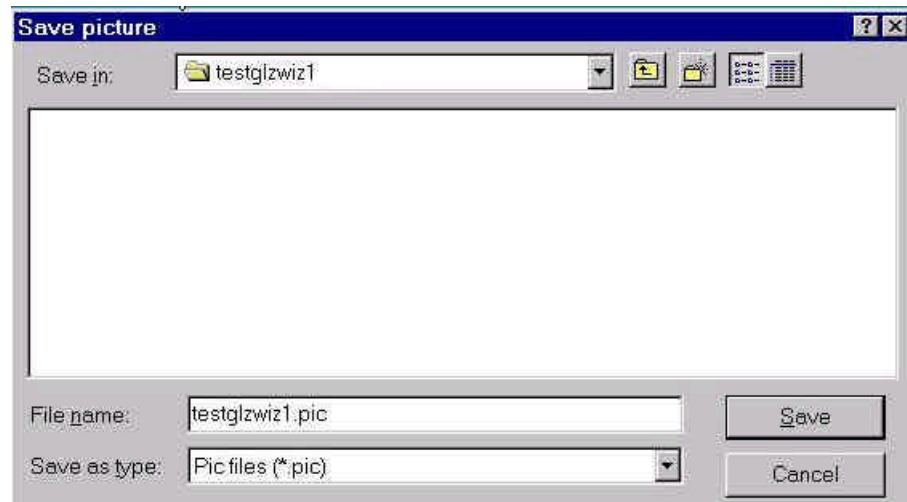
Figure 48. The Save Picture Dialog box of the Glazing Wizard with correct *file name*

Figure 49. The "New Glazing Preview" screen.

You are now ready to make this glazing a permanent part of your database. Click "Finished" when you are ready to commit this item to the library.

Note: The Library Manager window may need to be closed (for the bitmaps to refresh) before the new glazing will be visible.

You have now successfully completed the creation of a new glazing item for Desktop Radiance. You can return to the library browser to view your custom glazing item, or you can return to AutoCAD to attach it to the appropriate surface(s) of your model.

NOTE: If the spectral data library is out of date, updates are available from the NFRC's Spectral Data Library webpage, http://www.nfrc.org/sdl.html/ . After downloading, extract contents into a convenient temporary directory.

Then in Optics5, use the "File → Add files to User Database…command to select the spectra data file(s) to be merged with the User Database. Please see the Optics5 on-line user manual for more information. Updates for Optics5 are available from http://windows.lbl.gov/materials/optics5/ .

Furnishing Library Browser

The Furnishing Library Browser allows you to view all available furnishings and their properties. The Furnishing Library Browser *(figure 15)* allows you to view all the available furnishings and their properties. You can browse for items in the Furnishing Library by scrolling through the list. When an item has been highlighted the properties can be viewed by clicking the PROPERTIES button. You can search the furnishing library by keyword using the "Find" button. Type the common name or a fragment of the common name in the white box next to the FIND button. Then click on the FIND button. It will find the first occurrence of the item. Click on FIND again to find the next occurrence. You can sort the displayed items alphabetically by clicking on the heading name for each column of the table.
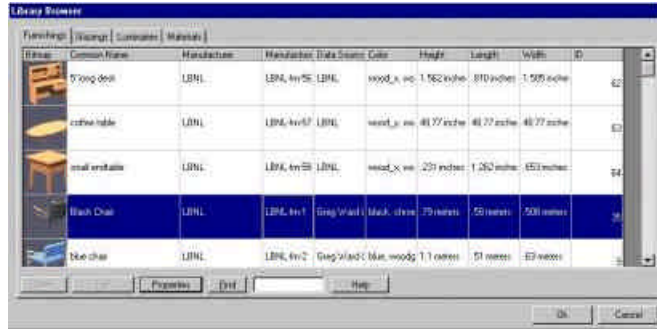
Figure 50. The Furnishing Library Browser

Furnishing Editor (Furnishing Wizard)

In addition to the predefined Desktop Radiance furnishings, custom furnishings may be created in the Furnishing Editor, through the Furnishing Wizard. To enter the Furnishing Editor from Desktop Radiance, go to Radiance → Furnishings → New Furnishing. Or select the Furnishings tab of the Library Manager to bring the Furnishings Library to the foreground. At this point you will see the"*Welcome to the Desktop Radiance Furnishing Wizard*" screen (*figure 16*.

"Welcome to the Desktop Radiance Furnishing Wizard"
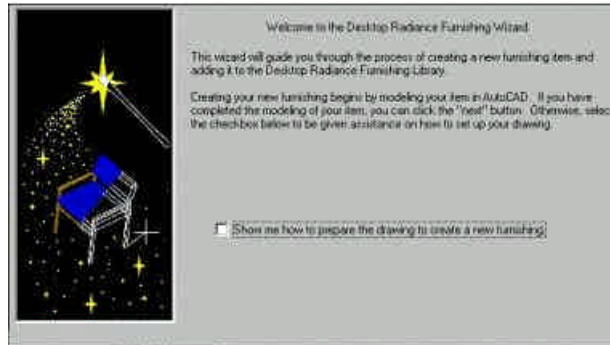
Figure 51. The "Welcome to the Desktop Radiance Furnishing Wizard" Screen.

This wizard will guide you through the process of creating a new furnishing item to be added to the Desktop Radiance Furnishing Library. Creating your new furnishing begins by modeling your item in AutoCAD. If you have completed the modeling of your item, click the "next" button, and you will be lead to the "Select the drawing and project folder" screen. Otherwise, select the checkbox to be given assistance on how to set up your drawing, beginning from "How to model a furnishing and prepare it for the Desktop Radiance Library".

"How to model a furnishing and prepare it for the Desktop Radiance Library "

- Launch Desktop Radiance and set the appropriate units for the drawing by selecting Radiance → Preferences… Be sure that you model the furnishing with a scale factor of 1.0. In other words, one meter in your drawing represents one meter in "real life".

- Next, model the geometry of the item using standard modeling techniques.

- Attach the appropriate materials to the surfaces of your furnishing. NOTE: Do not attach any other furnishing, glazing, or luminaire items. They are ignored.

- When the furnishing model is complete, click "Next" to continue.

"Synchronize the drawing with a temporary project folder"

You are now ready to convert the contents of your drawing into Radiance format.

- To define a temporary project folder where the Radiance geometry for the furnishing will be stored, use the Radiance → Project → Project Folder... command. A dialog box called "Open Project" will appear telling you that "An existing project directory is associated with this drawing. Do you want to use the existing directory, start over from scratch (overwriting the old project information), or locate another project directory (new)?" Select "New".

- A standard browse dialog box will appear. Browse to a convenient directory, then type the name of a temporary project directory in the "open" edit box.

- A dialog box called "Define Scenario" will appear. Provide a name such as "temp".

- Start the synchronize process with the Radiance → Project → Synchronize command. You will need to select the specific graphic entities that you want to be part of your furnishing. If the furnishing includes everything, then type "all". Press "Enter" two times to start synchronizing. Very complex drawings may take several minutes to complete.

- When the synchronization process is complete, click "Next" to continue.

"Select the drawing and project folder"

At this point you should have already modeled the new furnishing item and synchronized your drawing. If the drawing is not ready, please click the "back" button to be guided through this process (see above).

Figure 52. The "Select Drawing and Project Folder" screen.

- Specify the AutoCAD drawing name of the new furniture and project folder *(figure 17)*.

"Describe new furnishing"
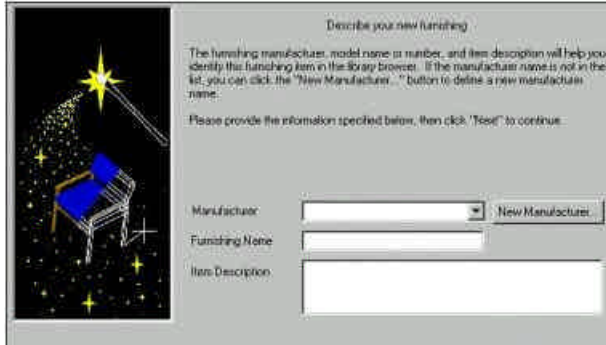
Figure 53. The "Describe New Furnishing" screen.

- The furnishing manufacturer, model name or number, and item description will help you identify this furnishing item in the library browser. If the manufacturer name is not in the list, you can click the "New Manufacturer..." button to define a new manufacturer name.

- Provide the information specified and click "Next" to continue *(figure 18)*.

"Specifying the drawing units"

Desktop Radiance needs to know the units (meters/inches) used for the furnishing so that it is properly scaled when it is inserted into a new drawing. You may have previously specified the units in the Radiance → Preferences... dialog box.

"New Furnishing Preview"

Click the preview button *(figure 19)* to start Winrview and to inspect/preview your new furnishing item before committing it to the library. To create the preview image, use the File → Save as... command of **Winview** to save the image. **The default name** *oct_V1.pic* **needs to be changed to reflect the actual name of your item** (Figure 54) **and** (Figure 55) . In this example, the drawing name is testfrnwiz1 so the image name has to be testfrnwiz1.pic.
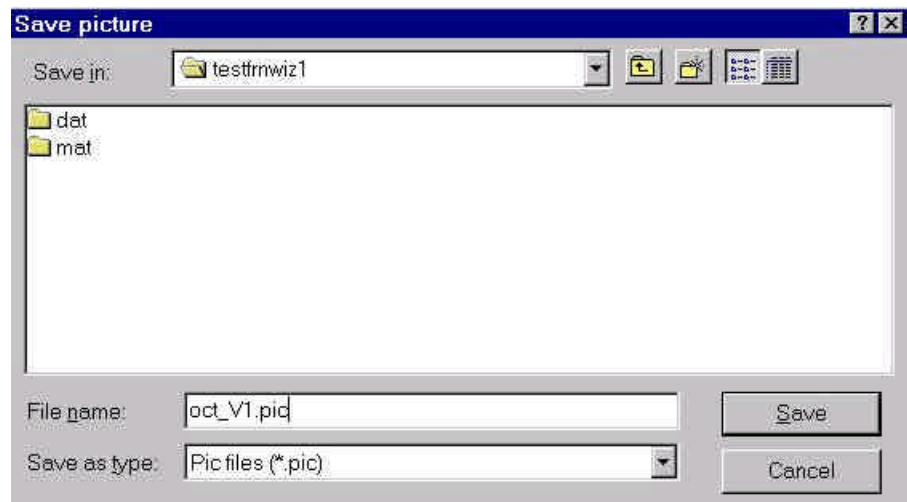
Figure 54. The Save Picture Dialog box of the Furnishing Wizard with default *file name*
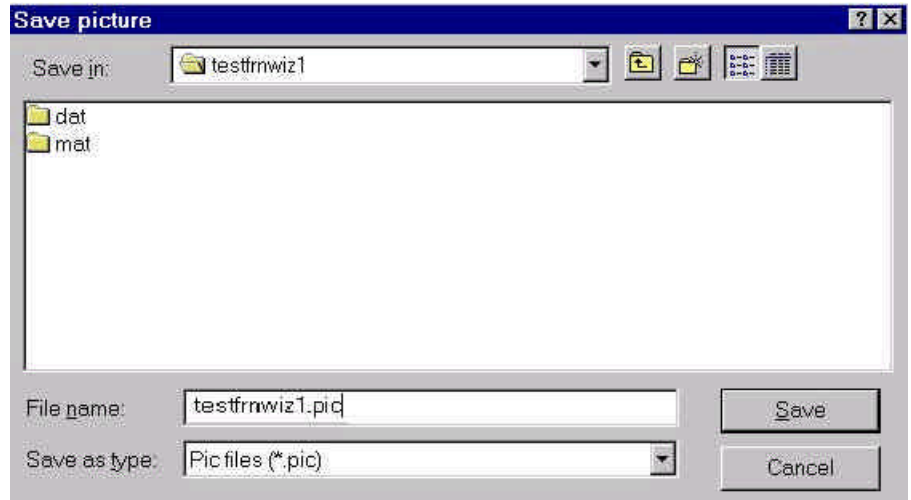
Figure 55. The Save Picture Dialog box of the Furnishing Wizard with correct *file name*
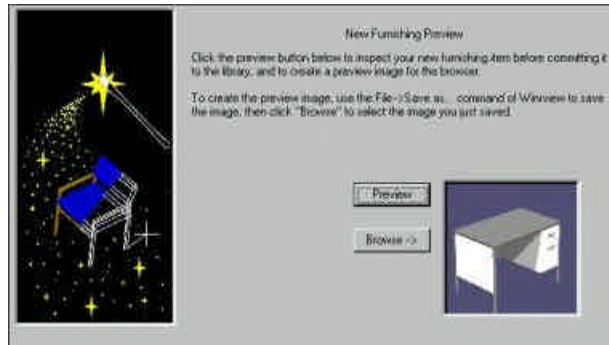
Figure 56. The "New Furnishing Preview" screen.

You are now ready to make this furnishing a permanent part of your database. Click "Finished" when you are ready to commit this item to the library.

Note: The Library Manager window may need to be closed (for the bitmaps to refresh) before the new furnishing will be visible.

You have now successfully completed the creation of a new furnishing item for Desktop Radiance.

Luminaire Library Browser

The Luminaire Library Browser *(figure 20)* allows you to view all of the available luminaires and their properties. You can browse for items in the Luminaire Library by scrolling through the list. When an item has been highlighted the properties can be viewed by clicking the PROPERTIES button. You can search the furnishing library by keyword by using the "Find" button. Type the common name or a fragment of the common name in the white box next to the FIND button. Then click on the FIND button. It will find the first occurrence of the item. Click on FIND again to find the next occurrence. You can sort the displayed items alphabetically by clicking on the heading name for each column of the table.

Figure 57. The Luminaire Library Browser.

Luminaire Editor (Luminaire Wizard)

In addition to the predefined Desktop Radiance luminaires, custom luminaires may be created in the Luminaires Editor, through the Luminaire Wizard *(figure 21)*. It is not yet possible to "edit" existing luminaires in the library. To enter the Luminaire Editor from Desktop Radiance, go to Radiance → Luminaires → New Luminaire. Or select the Luminaires tab of the Library Manager to bring the Luminaires Library to the foreground. At this point you will see the "Welcome to the Desktop Radiance Luminaire Wizard" Screen.Wizard welcome screen will appear.
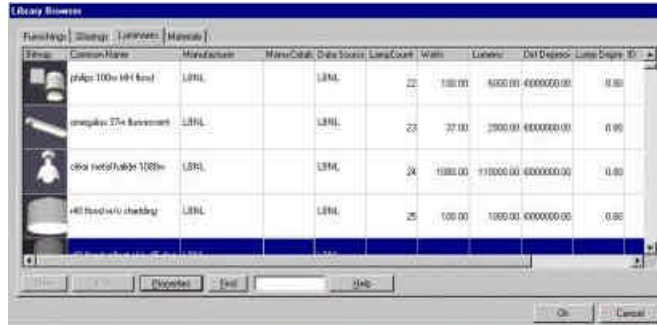

Figure 58. The "Welcome to the Desktop Radiance Luminaire Wizard" screen.

"Welcome to the Desktop Radiance Luminaire Wizard"

This wizard will guide you through the process of creating a new luminaire item and adding it to the Desktop Radiance Luminaire Library. Creating your new luminaire begins by modeling your item in AutoCAD. If you have completed the modeling of your item, you can click the "next" button, and go to the "Select the drawing and project folder" screen. Otherwise, select the checkbox to be given assistance on how to set up your drawing, beginning from "How to model a luminaire and prepare it for the Desktop Radiance Library".

"How to model a luminaire and prepare it for the Desktop Radiance Library"

- Launch Desktop Radiance and set the appropriate units for the drawing by selecting Radiance → Preferences... Be sure that you model the luminaire with a scale factor of 1.0. (1 meter in your drawing equals 1 meter in "real life.").

- Next, model the geometry of the item using standard modeling techniques.

- Attach the appropriate materials to the surfaces of your luminaire. NOTE: Do not include any luminaires, glazings or luminaires in your drawing.

- When the luminaire model is complete, click "Next" to continue.

"Define the light-emitting surfaces"

Desktop Radiance Luminaires have two types of light-emitting surfaces that you must create. The first is the self-luminous surfaces such as the light source or "bulb", and the second is the invisible light emitting or "imposter" surfaces. The imposter surface is typically a box enclosing the main light-making apparatus of your luminaire. For example, a pendant luminaire would have a box around the suspended part of the fixture, but it does not enclose the suspension cables or other mounting hardware. You identify these surfaces by attaching a special material from the materials library. These materials are only visible in the library while the Luminaire Wizard is active.

- Model the self-luminous or "bulb" geometry being careful to pay attention to surface normal orientation. Light emits only in the direction of the surface normal. Valid surface types include 3DFACES, closed 3DPLINES without holes, circle with "thickness" for cylindrical and linear sources, sphere, and the box.

- Attach the material called "Lamp Material" to the self-luminous surfaces.

- Model the imposter surface(s) of your model. A box is usually the best way to model this.

- Attach the material called "Luminaire Imposter Geometry" to the imposter in your model. NOTE: Do NOT attach light-emitting materials to non-light-emitting surfaces in your new luminaire! This will cause inaccuracies.

- When the luminaire geometry and material attachments are ready, click "Next."

Note: The accurate modeling of luminaires requires the accurate characterization of both the appearance of the luminaire and its effect on its surroundings. The "Imposter" surfaces are the way that Radiance knows where to associate the light distribution specified in the IES Candlepower Distribution file with your luminaire geometry. An invisible enclosing surface is required so that the surface geometries of your luminaire do not block the light and cause unrealistic shadows.

"Synchronize the drawing with a temporary project folder"

You now are ready to convert the contents of your drawing into Radiance format.

- To define a temporary project folder where the Radiance geometry for the luminaire will be stored, use the Radiance → Project → Project Folder... command. A dialog box called "Open Project" will appear telling you that "An existing project directory is associated with this drawing. Do you want to use the existing directory, start over from scratch (overwriting the old project information), or locate another project directory (new)?" Select "New".

- A standard browse dialog box will appear. Click the "New Folder" icon, then provide a name such as "temp".

- A dialog box called "Define Scenario" will appear. Provide a name such as "temp".

- Start the synchronize process with the Radiance → Project → Synchronize command. You will need to select the specific graphic entities that you want to be part of your luminaire. If the luminaire includes everything, then type "all".

- Press "Enter" two times to start synchronizing. Very complex drawing may take several minutes to complete.

- When the synchronization process is complete, click "Next" to continue.

"Select the drawing and project folder"
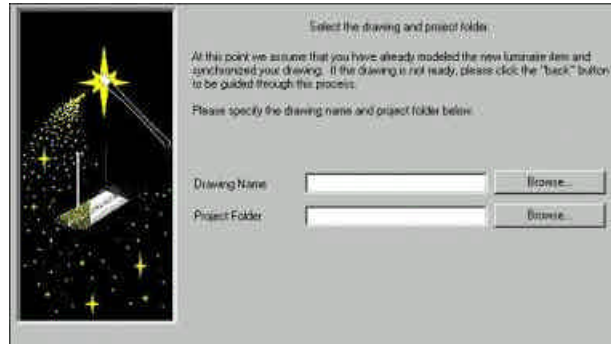
Figure 59. The "Select the Drawing and Project Folder" screen.

At this point we assume that you have already modeled the new luminaire item and synchronized your drawing. If the drawing is not ready, please click the "back" button to be guided through this process.

- Please specify the drawing name and project folder *(figure 22)*.

"Describe your new luminaire"
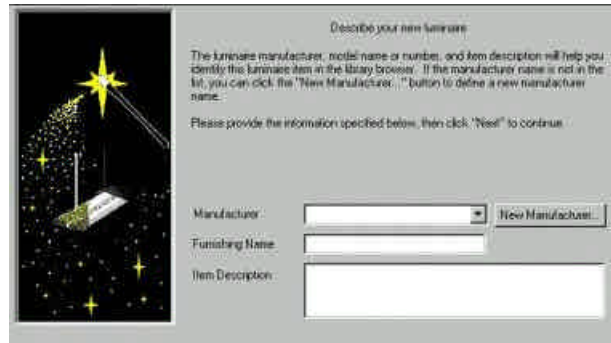
Figure 60. The "Describe Your New Luminaire" screen.

- The luminaire manufacturer, model name or number, and item description will help you identify this luminaire item in the library browser. If the manufacturer name is not in the list, you can click the "New Manufacturer..." button to define a new manufacturer name.

- Provide the information specified below, then click "Next" to continue *(figure 23)*.

"Specify the drawing units"

Desktop Radiance needs to know the units (meters/inches) used for the glazing so that it is properly scaled when inserted into a new drawing. You may have previously specified in the Radiance → Preferences... dialog box.

"Specify the Luminaire Distribution"
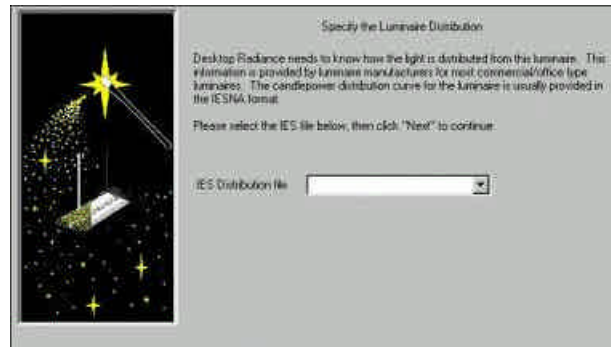
Figure 61. The "Specify the Luminaire Distribution" Screen.

Desktop Radiance needs to know how the light is distributed from this luminaire. This information is provided by luminaire manufacturers for most commercial/office type luminaires. The candlepower distribution curve for the luminaire is usually provided in the IESNA format. Please select the IES file, then click "Next" to continue *(figure 24)*.

"New Luminaire Preview"
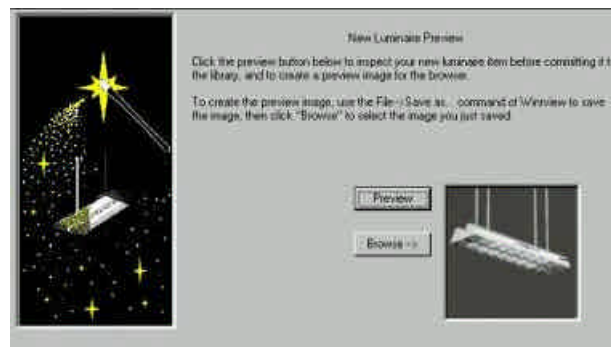
Figure 62. The "New Luminaire Preview" Screen.

Click the preview button *(figure 25)* to start Winrview and to inspect/preview your new luminaire item before committing it to the library. To create the preview image, use the File → Save as... command of **Winrview** to save the image. **The default name *oct_V1.pic* needs to be changed to reflect the actual name of your item** (Figure 63) **and** (Figure 64) . In this example, the drawing name is testlumwiz1 so

the image name has to be testlumwiz1.pic.
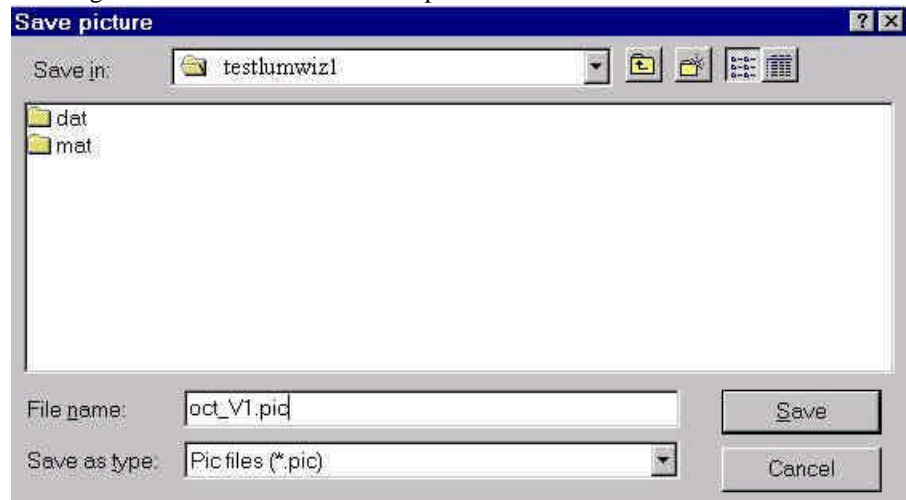
Figure 63. The Save Picture Dialog box of the Luminaire Wizard with default *file name*
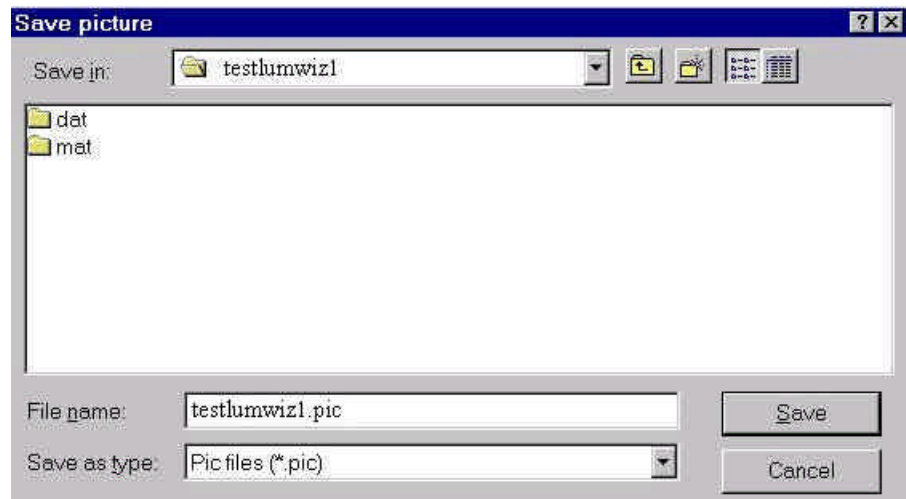
Figure 64. The Save Picture Dialog box of the Luminaire Wizard with Correct *file name*

You are now ready to make this luminaire a permanent part of your database. Click "Finished" when you are ready to commit this item to the library.

Note: The Library Manager window may need to be closed (for the bitmaps to refresh) before the new glazing will be visible.

Simulation Manager

Introduction

The Simulation Manager is the component of Desktop Radiance in which you simulate and render the model you have created in the graphic editor. After attaching Radiance entities to your drawing (for example: materials, luminaires, furnishings, glazings, cameras, etc.), you are ready to begin the simulation process. The simulation process involves the simulation of light interacting with the surfaces in your model. These calculations depend on the properties of the Radiance attachments, location/time and day settings, and accuracy parameters.

The simulation manager dialog box *(Figure 76)* allows you to keep track of all your simulations for a project. Each simulation and its associated properties and settings is called a "scenario". After completing a simulation, the interactive rendering or *Winrview* tools allow you to preview your model. Rview allows for adjustments to viewpoint location. The advanced dialog boxes of simulation setup provide a user-friendly means of adjusting light and shadow specifications, and other parameters that can create more accurate images, faster rendering images or a combination of these two factors. Through the use of the winrview tools and then with the **Image Analyzer**, you can create an image that best fits your design needs and objectives.

Camera Simulation

Here is where you can select a specific camera (view) to simulate and select the entities (geometry).

More text to go here.

Reference Point Simulation

Here is where you can select the reference point to simulate and specify the entities (geometry) for including in the simulation.
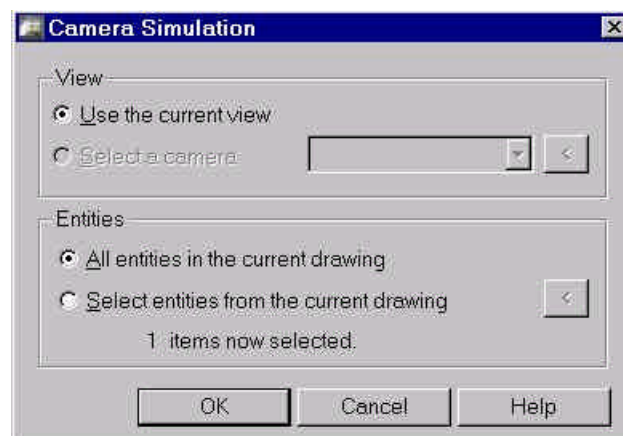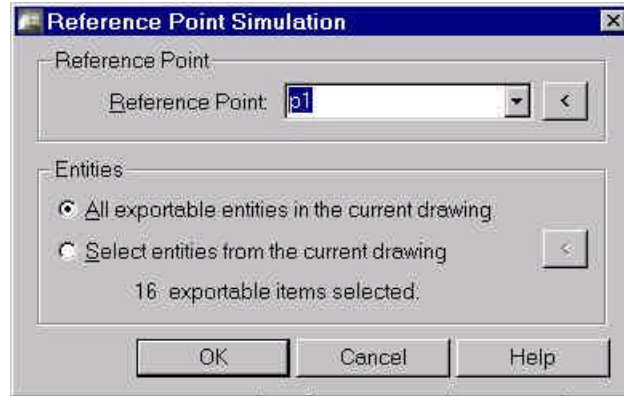
Figure 66. The Reference Point Simulation Dialog Box

More text go here.

Reference Grid Simulation

Here is where you can select the reference grid to simulate and specify the entities (geometry) for including in the simulation.
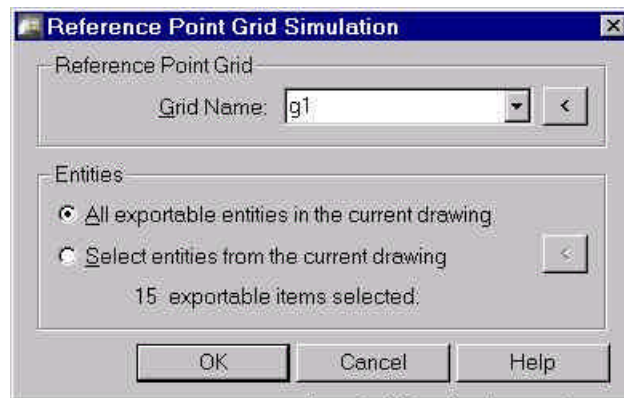
Figure 67. The Reference Grid Simulation Dialog Box

More text to go here.

Camera Simulation Setup

The Simulation Setup dialog box allows you to define the base parameters for your simulation scenerio. Depending on the type of simulation you are performing, Camera, Reference Point, or Reference Grid, You will see slightly differernt Setup Screens.

The Camera Simulation Setup dialog box (*Figure 68*) is accessed by beginning a simulation. Go to Radiance→Simulation→Camera.

Note: These following instructions describe the simulation setup process for a new drawing with a unique filename. If you have previously started a simulation of a drawing with the same name, you will get slightly different responses at this step. See **PROJECT FOLDER** for more info.
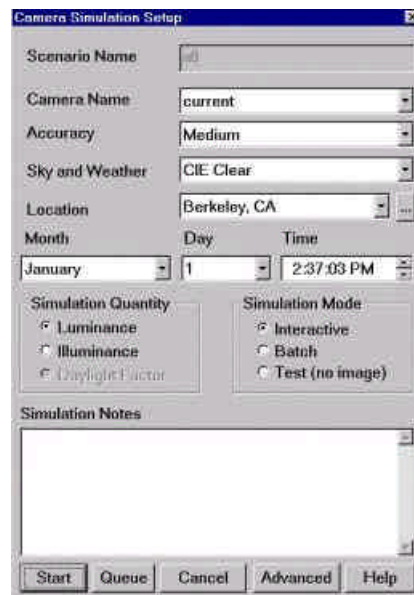
Figure 68. The Camera Simulation Setup Box

The Scenario Name box tells you the name of this particular scenario. It is the name previously entered in the Define Scenario Dialog Box. The scenario name is uneditable in the Camera Simulation Setup Box.

The camera name box allows you to choose the camera or view that you would like for this scenario. It automatically selects the camera previously selected but others can be chosen from the pulldown menu. To create new saved views of your model in autocad, go to View→Named Views or type **ddview**. More information on **ddview** may be found in the ACAD help manual.

Note: Winrview can also be used to create custom views such as plan or . See ____ for more info. The dialog box that appears allows you to save the current view as a saved named view that can be accessed from the Camera Simulation Setup Box for simulation.

The accuracy box allows you to select the accuracy. For Version 2.0 BETA, only a Medium level of accuracy is available. However, this setting can be overwritten by changing the parameters under the "**Advanced**" dialog box.

The Sky and Weather box allow you to choose the sky conditions for your model. You can choose from CIE Clear, Overcast, Intermediate, and Uniform. Clear will have sharp patches of light and quite a bit of bright diffuse light. Overcast will have shadows, dimmer diffuse light, and some light specular highlights. Intermediate has sharp patches of light but the dim diffuse light of an overcast rendering. Uniform will have shadows and dimmer diffuse light than overcast with very faint specular highlights. For more information, consult the Illuminating Engineering Society of North America (IESNA) *Lighting Handbook.* .

To render with no sky or to turn the sky off, select a date and time that is at night.

The location box allows you to choose the location for the simulation. There are a few predefined locations. You can also define new locations by selecting "New…" from the pulldown menu. This will bring you to the Add New Location dialog box*(Figure 71, p. 58)*. For more on adding a new location see **Add New Location.** The box with three dots next to the Location Box will display the Longitude and Latitude of the currently selected location.

The date, and time boxes allow you to define such factors for your scenario.

In the Camera Simulation Setup Box there is also a choice of Luminance or Illuminance. The simulation quantity settings determine what kind of information your image will contain.

> *Luminance* is the amount of light *leaving* a surface from a specific direction and includes the final surface reflectance. It closely resembles what the eye sees.

> **Illuminance** is the total amount of light *reaching* a surface from all directions. Illuminance does not include the reflectance of the surface where the illuminance is being measured. The "illuminance" simulation quantity setting changes the Radiance computation so that the final surface reflectance is not included in the determination of the brightness of each pixel of the image.

The Simulation Mode box gives you choices of interactive or batch. Interactive allows you to experiment with exposure, ambient light and other settings in the interactive rendering program, *Winrview*. There is an online table listing the possible parameters and their effects at http://radsite.lbl.gov/deskrad/param_table.htm

After determining the custom settings for your building in *winrview*, **DUPLICATE** the scenerio and click on the **ADVANCED** button on the Camera Simulation Setup Box to change the custom settings and then start the render using batch mode. After the simulation is finished, the image will not automatically appear. Click on **DISPLAY/ANALYZE** in the Simulation Manager to view the image
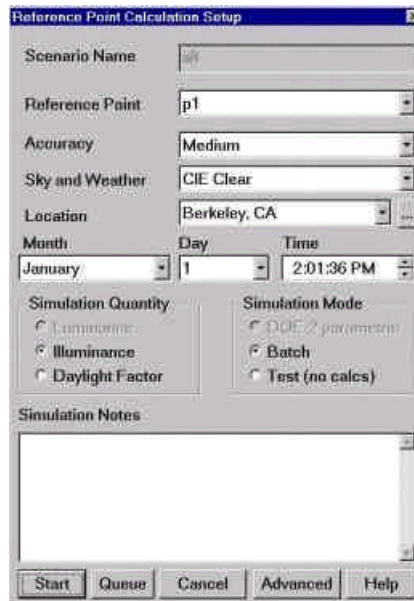
Reference Point Calculation Setup

Figure 69. The Reference Point Calculation Setup Dialog Box

More text here.
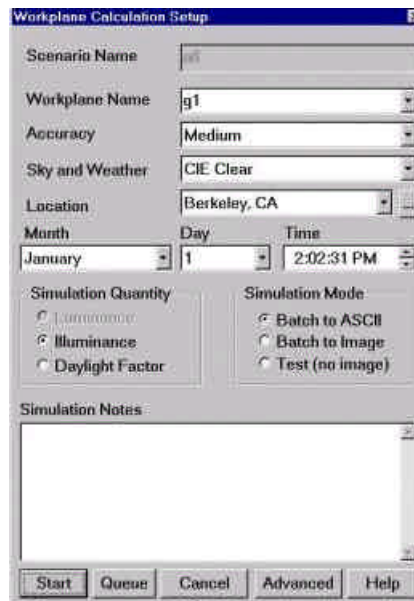
Reference Grid Calculation Setup

Figure 70. The Reference Grid Calculation Setup Dialog Box

More text to go here.

Add New Location

To add a new location, enter all the requested information, click OK and a new location is added to the main Desktop Radiance database and can be accessed by other projects.
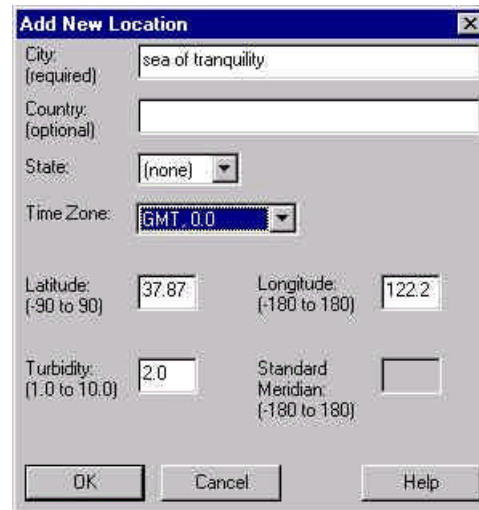

Figure 71. The Add New Location Dialog Box

The "City" field is required to identify your location and therefore must be a unique name. The latitude is an angular measurement that defines where your location is relative to the equator. The latitude of the equator is equal to 0. The latitude of the North and South poles is 90 and –90, respectively. It should be entered in decimal degrees. From 0 to 90 is in the northern hemisphere and from 0 to –90 is in the southern hemisphere. So, for example, the approximate latitude of Athens, Greece would be Lat 37.9. This number means that Athens is 37.9 degrees north of the equator.

The longitude is an angular measurement that defines your location relative to the standard meridian in Greenwich, England. The longitude of the Greenwich Meridian is equal to zero. The number you would enter for the longitude of your location is between –180 and 180. Longitudes west of Greenwich are positive and those east of Greenwich are negative. Like the latitude, the longitude should also be entered in decimal degrees. Using Athens, Greece as an example again…Athens has a longitude of –23.7. This number means that Athens is 23.7 degrees east of Greenwich, England.

The Time Zone allows you to give the name of the time zone that your location is in, for example Pacific Standard Time, or PST. If you don't know which Time Zone you should be using or if yours is not listed, chose "Other…" from the bottom of the list and then fill in the Standard Meridian field.

Standard Meridian is required when you do not specify a time zone. It is the longitude of the middle of your time zone. To calculate it, take the difference in time between the new location and the Greenwhich, England timezone and multiply that number by 15. In equation form, the standard meridian looks like this: (GMT)-(your time)*15=Standard Meridian. For Athens-Greece, it's -2*15, so the Standard Meridian is -30. Hint: Standard meridian is always an interger, multiple by 15.

If you don't know the time difference between your time zone and Greenwich Mean Time, there are many resources on the internet. The following website allows you to easily find the latitude and longitude of your location within the United States:

If your location is not in the United States then you can visit the following website to find the latitude and longitude of your location, click on the "Access GEOnet" button:

The turbidity factor corresponds to atmospheric scattering. A turbidity factor of 1.0 indicates an ideal clear atmosphere (i.e. a completely dark sky). Values less than 1.0 are physically impossible. The CIE standard value for Turbidity is 2.0 (very clear sky) and the maxium is 6.0 (very hazy, polluted sky). Unfortunately there is very little data available for sky turbidity.

Advanced Calculation Properties

The Advanced Calculation Properties dialog boxes (Figure 72, Figure 73, Figure 74, and Figure 75) are a series of settings under the main categories of Analysis, Lighting, Geometry, and Rendering. They are most commonly used in the final steps of creating a highly accurate, high quality rendering. To access these dialog boxes click ADVANCED on the Simulation Setup dialog box. Many of these settings are also found in the interactive rendering program, win*rview*. The settings in winrview are intended to allow the user to quickly and easily test different values and settings. When ideal settings are found, then the user can make the changes in the Advanced Calculation Properties dialog boxes which will save the setting with the scenario. After making changes in the Advaned Calculation Properties dialog boxes a high quality batch mode simulation can be made by selecting batch on the simulation setup dialog box.

The tab of the Advanced Calculation Parameters dialog box (Figure 72) includes settings that can help with the analysis of images created in a Radiance simulations.

Figure 72. The Advanced Tab of the Calculation Parameters "Analysis" Dialog Box

The settings in the Image Exposure section affect how light/dark your image will appear. By selecting Auto (linear average), the exposure will automatically be set to 1.0. This is a good exposure starting point. If you have a specific value or you want the image to be darker or lighter than usual, then use the absolute settings or the relative f-stop settings.

The "Use Custom Post-processing Settings" checkbox refers to whether you are using a PFILT setting other than the default. If you are using a different value then this box should be checked.

The Save Z-buffer data check box allows you to store in the specified file the distance from the image plane to the ray intersection point in the scene. This file can be used to improve the rendering time of animations, but this is not currently supported by Desktop Radiance.

TheLighting tab of the Advanced Calculation Parameters dialog box (Figure 73) allows you to control various settings that have to do with how light will be simulated in your model.
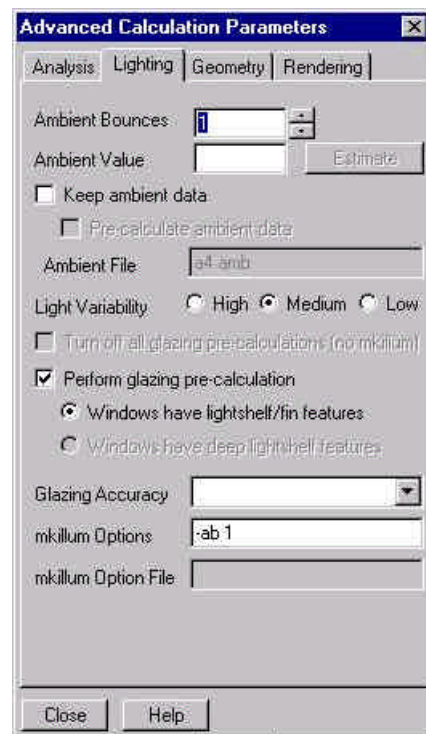
Figure 73. The Lighting Tab of the Advanced Calculation Parameters Dialog Box

Ambient bounces sets the number of times light is required to bounce from surface to surface before finding a light source such as the sun, the sky, or a luminaire. The lower the number, the faster the calculation but you may not be including all of the ambient light in your scene. At the last bounce of light, a constant background ambient value is added to the computation as specified in the Ambient Value box. A reasonable number to use is anywhere between 1 and 5.

If you plan to compute many renderings of the same 3D model, you can check the "keep ambient data" button and apply the name of a file to store the indirect lighting

calculation. This will allow subsequent simulations to compute much more quickly. However, make sure that **all** geometry, sky, and lighting parameters remain constant for any given ambient data file.

If your scene has complex glazings or fenestrations, you can select to "Perform glazing pre-calculation". This causes Radiance to initiate a pre-calculation of the distribution of light through your complex glazing or fenestration system. By default, all Desktop Radiance glazings are identified as potential complex glazing surfaces. Un-checking this box disables the pre-calculations and will result in a faster calculation.

The glazing accuracy field sets overall accuracy and calculation requirements of the glazing pre-calculation. This field is currently set to medium accuracy only. You can provide more accurate pre-calculation parameters in the mkillum options field. See Mkillum at *http://radsite.lbl.gov/radiance/man_html/mkillum.1.html* for more information.

The Geometry Tab of the Advanced Calculation Parameters Dialog Box (Figure 74) deals with various settings related to the 3-dimensional geometry of your scene.
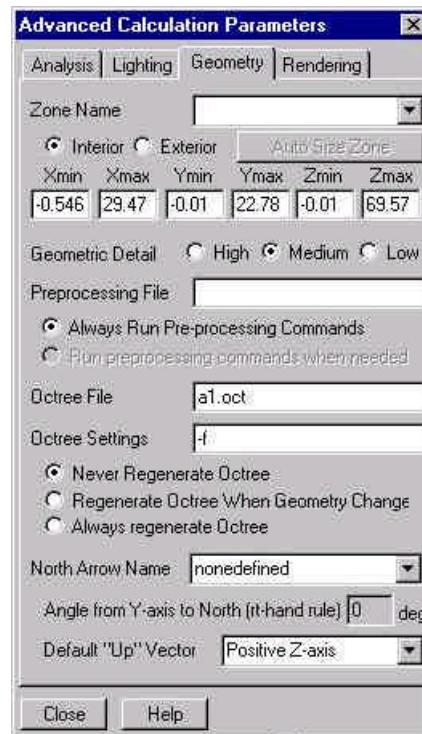
Figure 74. The Geometry Tab of the Advanced Calculation Parameters Dialog Box

A zone is a volume of space that indicates where you intend to focus the simulation on. **The Zone is an optional parameter**. The default zone encompasses the entire scene. To increase the accuracy of your simulation, define a zone which encompasses the smallest contiguous volume of space in which you intend to perform lighting simulations. For example, if you have an expansive model of a high-rise office building but you are mainly interested in the left corner cubicle on the 5th floor, you should define a zone which encompasses only the cubicle area by using the Radiance → Analysis → Define Zone command within the graphic editor. The name of the zone you create will appear in the Zone Name field. The 6 point definition boxes (Xmin, Xmax, Ymin…) are the dimensions of the selected zone. If

your scene is predominately composed of small geometric entities relative to the overall size of the scene, then the Geometric Detail setting can be used to improve the accuracy of your simulations. Medium is the default setting and is suitable for most situations. A low geometric detail setting may speed up the simulation process, but the accuracy may be reduced.

The octree file specifies the name of the intermediate scene geometry file used for increasing the speed of the ray-tracing calculations. This value changes with the name of your scenerio necessitating the re-generation of the octree for each scenario. If your geometry has not changed from a previous scenerio, you can replace the displayed filename with the octree file from the other scenerio that you would like to use For more information on the octree settings, see http://radsite.lbl.gov/radiance/man_html/oconv.1.html.

The three selections below the octree settings box allow you to control how frequently the intermeidate scene geometry file is rgenerated. Usualy the octree is regenerated only once the first time the scenario is simulated, regardless of whether the geometry from the drawing changes. The "Regenerate Octree When Geometry Change" choice allows changes from your drawing to be carried forward into sebsequent duplicated scenario. "Always Regenerate Octree" will force the octree to be regenerated everytime the simulation is started even if no geometry has changed.

The Rendering Tab of the Advanced Calculation Parameters Dialog Box (Figure 75) determines the pictorial quality of the simulation image rendering from your Radiance model.

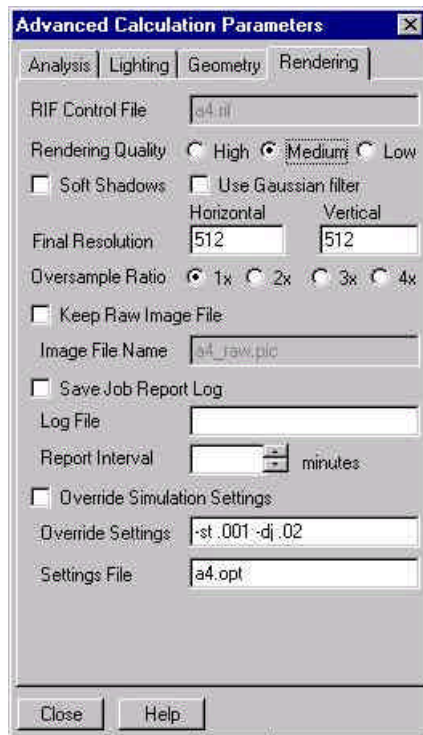*Figure 75. The Rendering Tab of the Advanced Calculation Parameters Dialog Box*

The RIF Control File box shows the name of the scenerio you are dealing with. This value is determined by the scenario name and can't be changed here.

Rendering quality sets the overall quality of the simulation. With the soft shadows box checked, penumbras will be rendered so that shadow edges are blurred when illuminated by non-point source lights. . Rendering time will be significantly longer with this option enabled.

Final resolution determines the horizontal and vertical pixel count of the rendered image. If the image is not square or if you do not know the exact size you would like, you may supply just the horizontal size and the program will figure out the vertical for you.

Usually Desktop Radiance filters the initial rendering to determine the average exposure and to perform any image sampling to reduse jagged lines and deletes the "raw" original image file. However, if you would like to perform animations or if you would like to be able to recover a very large image that has crashed for some reason, then the raw image needs to be preserved. Oversample Ratio allows you to reduce aliasing and jagged lines in your image. By increasing this value, lines will become smoother. Increasing this value increases rendering time proportional to the product of the two resolution values. Increasing the oversample from 1x to 2x will increase rendering time by 4 times.

If you would like to preserve a history of the ray-tracing process for later analysis or to determine possible causes of a failed simulation, then you can select the "save Job Report Log" and provide the log file name. The "Report Interval" field determines how often the log file is updated with the rendering process.

High Quality Renderings

Before creating a high quality rendering, it is best to validate your scenario in the interactive rendering program *winview*. To do this, simply render your image in the Interactive Mode. This is the default mode setting in the Simulation Setup Dialog Box. Once you are satisfied with the geometry, views, materials, and all other aspects of your model, it is ready to start a high quality rendering. In the Simulation Manager dialog box select the scenario that you would like to become a high quality. Click "duplicate" and provide a new scenario name. Once the Simulation Setup Dialog Box appears select Batch as the mode choice. A batch rendering allows you to render the image of your model at a far greater resolution than your monitor resolution. Click the ADVANCED button in the Simulation Setup dialog box and select the RENDERING tab. First select High or Medium quality for your rendering. Then enter the final resolution that you would like. Next, select the amount of over sampling that you would like. Over sampling reduces the "jaggies". Although be careful with this setting, each incremental increase of over sampling can quadruple your rendering time. A fairly high quality rendering can be created by increasing the oversampling ratio to 2x, on the "lighting" tab set the light variability to "high", on the "geometry tab set the geometric detail to "high". If the above settings do not result in a high enough quality, then try setting rendering quality on the "rendering" tab to "high".

Simulation Manager

The Simulation Manager provides you with tools to manage your scenarios. All of the properties and settings of your simulation are associated with a **scenario**. Each scenario is represented on a separate row of the simulation manager dialog box grid.
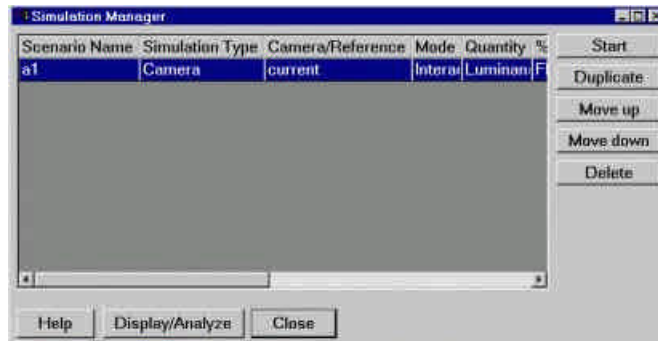
Figure 76. The Simulation Manager dialog box

The START button will begin a simulation that you have highlighted from the list. The DUPLICATE button allows you to duplicate a highlighted scenario and change settings on the Simulation Setup Dialog Box. MOVE UP and MOVE DOWN will change the order of the scenarios. DELETE will delete the highlighted scenario. CLOSE closes the Simulation Manager dialog box. After your rendering is finished and saved, the Display/Analyze button can be used to launch *Winimage*, the image analyzer. For more information, see *Image Analyzer*.

The columns of the Simulation Manager grid include:

- **Scenario Name** – the name you specified in the Graphic Editor when you started the simulation

- **Simulation Type** – Camera, Reference Point or Reference Grid simulation

- **Camera/Reference** – the name of the Camera, Reference Point or Reference Grid you selected when you set up the simulation. This column will show "current" if you did not select a specific camera, but instead used the currently active view displayed in the Graphic Editor.

- **Simulation Mode** – interactive, batch, or test simulation

- **Simulation Quantity** – luminance or illuminance

- **% Done** – currently either Ready, In Progress, or Done

- **Accuracy** – currently only Medium is provided

- **Sky Type** – CIE Clear, CIE Intermediate, CIE Overcast, or Uniform sky

- **Location** – The name of the location specified in the Simulation Setup dialog box

- **North Arrow** – The name of the orientation North Arrow you selected in the Simulation Setup Advanced dialog box, geometry tab

- **Month** – The month of the year on which the simulation will be performed

- **Day** – The day of the month on which the simulation will be performed

- **Time** – The time of day on which the simulation will be performed

- **Zone** – The name of the Zone created in the Graphic Editor for this simulation

- **RIF File Name** – The name of the Radiance Input File that is created by the Simulation Manager for each scenario. This file can be found in the **project folder** for the current drawing.

- **Preprocess** – The name of the Preprocess command file that is created by Desktop Radiance to pre-compute the intermediate **octree** file for block entities inside your drawing.

- **Simmode String** – This field is controlled by the Simulation Manager. It displays the command-line options for the **rad** command that will be used to start this simulation based on the parameters you specified.

Project Folder

All geometry, properties and settings of your scenarios are stored in a common project folder. The project folder is automatically created when you start your first simulation. The default project folder is located in the installation directory for Desktop Radiance (usually C:\Program Files\Desktop Radiance) in a sub-folder with the same name as the drawing. You can change this directory or re-connect your drawing with a project folder that has been moved with the Radiance → Project → Project Folder menu command. You can duplicate the entire project folder keeping all of the simulation data intact with the Radiance → Project → Duplicate Project command. Because the *Radiance for Windows* rendering engine can not currently deal with folder names with the full complexity of characters that Windows allows, you should take care to specify a folder name that only includes alpha-numeric characters, and the underscore.

If you select a project folder that already contains information from previous simulations, Desktop Radiance will first attempt to validate that the drawing and the simulations found in the specified folder match. Desktop Radiance will first check to see if a project database (DRADMAIN.MDB) exists in the specified project folder, and if so it will compare the unique project identification number of the Drawing with the project identification number stored in the project database. If the project identification numbers do not match, you will not be allowed to use the specified project folder. In earlier versions of Desktop Radiance (1.02 and earlier) it was possible to override the fact the project identification numbers did not match. This behavior has been changed to prevent the possible loss or corruption of information that can occur if the drawing and database are not an appropriate match.

If the drawing which you want to start the simulation and rendering of conflicts with the name of another project and/or drawing, you will be prompted with the Project Database Conflict Dialog box . If Use Existing is selected, the information in the existing project folder will be used and new information added to the existing project database. Information will not be overwritten, but if significant changes have been made, overwriting the project may be recommended.   If New is selected, you may be prompted by another dialog box to locate and create the new directory .
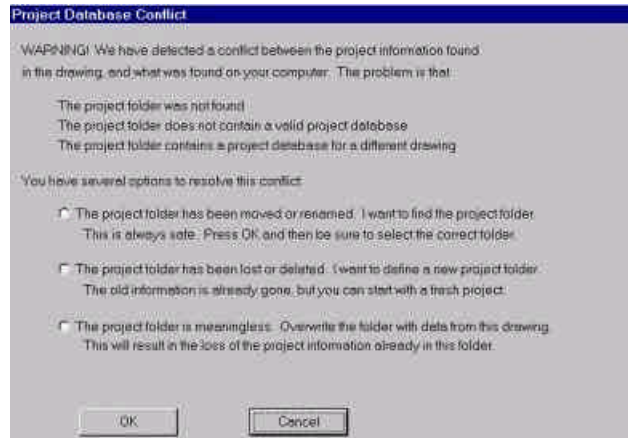
Figure 77. The Project Database Conflict Dialog Box

When the project folder or database files have been deleted, the following dialog boxes will appear. They appear after attempting to start a simulation. They first inform you that the project database cannot be found(Figure 78, p.66). Then an open file dialog box will appear. At this point, if you know the folder and drawing exist somewhere, click on the OK button, find the ACAD drawing which is the basis of the simulation, and double click on it. If either the folder and or drawing does not exist, click on the OK button, and either find the database file called dradproj.mdb, if it still exists, or click OPEN to create a new one.

Figure 78. The Locate Project dialog box

This will bring up the Create New Project File dialog box(Figure 79, p.66). Selecting Yes will create a new project folder with the given name.
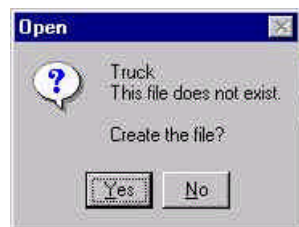

Figure 79. The Create New Project File dialog box

Reference Point Analysis

When simulating a reference point, the Reference Point Properties dialog box (*Figure* 80, p. 67) can be accessed by first simulating by reference point and then by clicking on the DISPLAY/ANALYZE button in the Simulation Manager(Figure 76, p. 64).
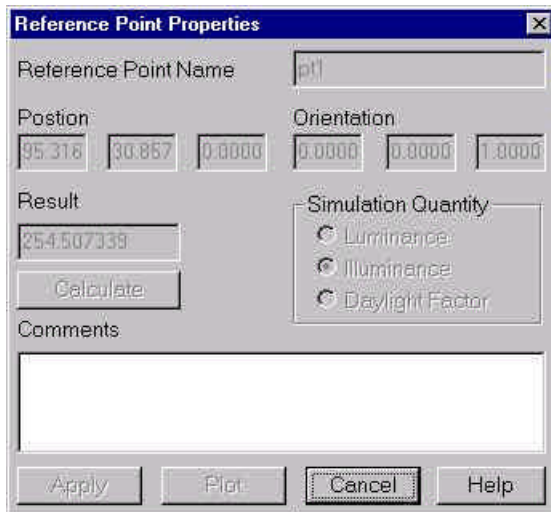
Figure 80. The Reference Point Properties dialog box

Workplane Grid Analysis

The Workplane Grid dialog box (Figure 82) can be accessed by first simulating by reference grid and when finished, click on DISPLAY/ANALYZE in the Simulation Manager.

When simulating a grid or a point, most accurate results require that you set options to high on the Geometry and Lighting Tabs of the Advanced Calculation Parameters, and ambient value to 0. Ambient value may be set to zero by clicking on the ADVANCED button and adding –av 0 0 0 to the "Override Settings" box (*Figure 12)*:

Figure 81. The Override Settings box

The grid point values may be imported into Excel or other spreadsheet programs for further manipulation. The values are saved to a text file in the project folder. The name of the file is the grayed out file name shown in the "Data File:" field.
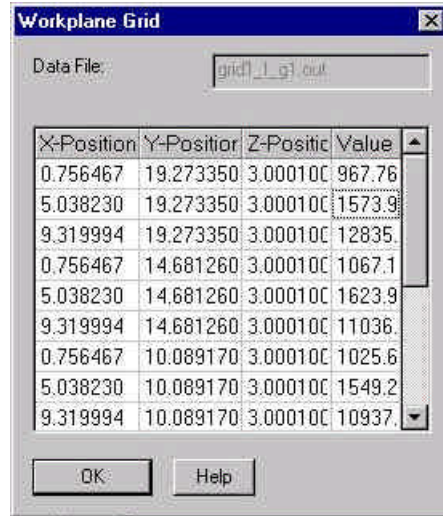
Figure 82. The Workplane Grid dialog box

Define Scenario
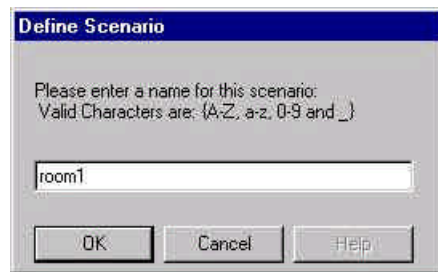
Figure 83. The Define Scenario Dialog box

After initiating any of the Radiance → Simulation commands, you are prompted to define the scenario name. The scenario contains all of the geometry, lighting, camera or reference point/grid and accuracy parameters for a particular simulation. Every scenario needs to have a unique name. The name is shown in the first column of the Simulation Manager and becomes the prefix of files created in the project folder. For example, for a scenerio named room1, the files created will have names such as room1_sky.rad and room1.rif. Only alpha-numeric characters and the underscore _ are permitted. No spaces can be used in scenario names.

Image Analyzer

Introduction

The Image Analyzer *(Error! Reference source not found.)*, also known as **Winimage**, may be opened from within Desktop Radiance with the Radiance→Tools→Image Analyzer menu, or by clicking on the Image Analyzer icon created by the install program in the start menu.
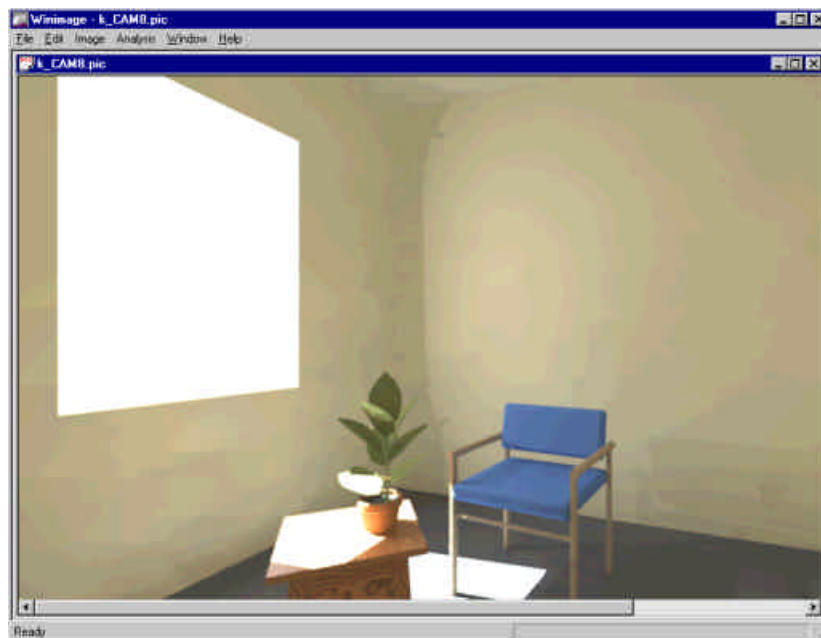
Figure 84. The Image Analyzer Dialog Box

The Image Analyzer displays Radiance images and provides you with tools to perfrom various analyses and image manipulations. Radiance images are saved with the default extension .pic. You may also convert images with the File → Save As… command so they can be read by other imaging, paint, or presentation programs. All commands operating within winimage, with the exception of redraw, will result in a new image file being created in your project folder. This is so the different versions of the image will be distinguishable.

A file naming convention in Winimage is adding "_" and an abbreviation of the executed command, i .e. "fls" for falsecolor. Thus, if falsecolor is performed on

drawing.pic, the resulting falsecolor image will be drawing_fls.pic. If an annotation is performed on drawing_fls.pic, then the resulting image will be drawing_fls_ann.pic. The original drawing.pic is **not** overwritten. However, if falsecolor is performed on the same image twice, the second version will overwrite the earlier one.

Here is a list of possible file extensions and their meanings.

_avg = Image → Exposure → Image

_reg = Image → Exposure → Region (drag mouse to enclose a rectangular area)

_pt = Image → Exposure → Point (click on a point in scene)

_90 = Image → Rotate → 90 degrees clockwise

_180 = Image → Rotate → 180

_fh = Image → Flip → Horizontal

_fv = Image → Flip → Vertical

_pcd = Analysis → Human Sensitivity → Image

_fls = Analysis → FalseColor **or** Analysis → IsoContour

_ann = Analysis → Annotate

The Radiance RGBE Format

An important advantage of the Radiance Synthetic Imaging System is the high dynamic range provided by its RGBE image file format. It allows for storing real-world luminance and illuminance values across 77 orders of magnitude with 1% accuracy.

Images can contain either scalar data (which lacks the high dynamic range), or luminance/illuminance values. It is important to distinguish between those two formats because scalar images are not appropriate for analysis as they lack the real-world high dynamic range values.

Scalar images result from the use of any of the commands under the Analysis menu.

High dynamic range images result from the use of any of the commands under the "image" menu. A scalar image cannot be converted backto a high dynamic image.

Luminance vs Illuminance Images

Radiance image files can contain either radiance (luminance) or irradiance (illuminance) values. Unfortunately, Winimage currently does not distinguish between these two different types. It is therefore possible to perform operations and label images in a manner inconsistent with the underlying data stored in the image file. It is incombent upon the user to ensure that the appropriate quantities are analyzed and displayed.

File

Open

Image Analyzer will only open Radiance .pic images for viewing and analysis. It will not open pictures or images saved in other file formats.

Save As

A Radiance image may be saved as a pic, gif, tiff, pct (mac pict file), eps, or bmp. The saved image, if in a format other than Radiance's .pic, will not be openable by winimage again.

Image

The functions available under the Image menu result in new images which preserve the real-world, high dynamic range of the original image. Such images are suitable for later manipulations with functions under the analysis menu. You can print images by opening one of these files in a print program.

Redraw

Image Analyzer→Image→Redraw, this function redraws/regenerates your image. It does not create a new drawing.

Exposure

Image Analyzer→Image→Exposure, this tool adjusts the exposure level of the selected image, region, or point using a linear function with clamping. The adjusted image will be given a name with the extension *_pt.pic and saved as a new .pic file automatically as it is being displayed. This is similar to how a camera works and can only partially compensate for regions of the image which are too bright or too dark. The sky seen outside of windows, for example, will appear completely white if the image is exposed for the interior surfaces.

Image

Image Analyzer→Image→Exposure→Image. This tool adjusts the exposure by averaging all pixels of the image displayed in the foreground.

Region

Image Analyzer→Image→Exposure→Region, then select the region by clicking and dragging. This tool averages the image displayed in the foreground based upon the average value of a selected region. If the image has a washed-out or brightly lit window and a room's interior, the window may be selected for exposing. The resulting new image will be of a dimmer interior and a window which seems less bright.

Point

Image Analyzer→Image→Exposure→Point, then select a point on the image with the cursor. This tool adjusts the exposure relative to the point you have selected.

Rotate

Image Analyzer→Image→Rotate. This tool rotates the image either 90 degrees clockwise or 180 degrees. It is sometimes necessary to rotate plan view images so that the desired orientation of the image with respect to the top of the page is achieved.

Flip

Image Analyzer→Image→Flip. This tool will flip (mirror) the image horizontally or vertically. This is useful for creating reflected ceiling plans from parallel projection image looking "up" at the ceiling.

Analysis

The functions available under the analysis menu result in new images which lose the real-world luminance and illuminance values because they contain scalar data, not real-world luminance or illuminance values. They become unsuitable for further manipulations under the analysis menu.

Human Sensitivity

This tool is similar to an exposure adjustment but uses a variety of nonlinear and linear filters to mimic human visual perception. This tool compresses the dynamic range so that most of the details in a high-contrast image may be displayed simultaneously, similar to the visual experience one may have in the actual space. (See also **Pcond**).

Image

Image Analyzer→Analysis→Human Sensitivity→Image. The human sensitivity tool will consider the entire image *(Error! Reference source not found., left)* to determine the appropriate perceptual exposure setting. The resulting new image *(Error! Reference source not found., right)* may take a few minutes to complete, especially for wide-angle views.

Figure 85. Image before (left) and after (right) running Human Sensitivity. Notice that Human Sensitivity image shows exterior details that are not visible in the other image.
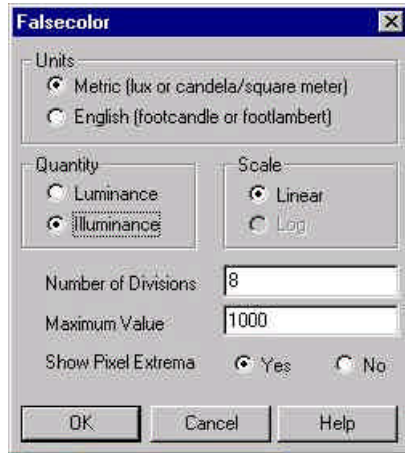
False Color

Figure 86. The Falsecolor Dialog Box

Image Analyzer→Analysis→Falsecolor brings up the Falsecolor Dialog Box (**Error! Reference source not found.**). When applied to a luminance image, falsecolor outputs (Metric) candela/m^2 or (English) footlamberts. When applied to an illuminance image, falsecolor outputs lux or footcandle. The number of divisions sets the number of intermediate, equally spaced values between zero and the maxium value that will be displayed on the legend. Show pixel extrema, if selected, will cause falscolor to annotate the image pixel with the max and min luminance or illuminance values *(Error! Reference source not found.)*. Be sure that the selected quantity matches the underlying image type.

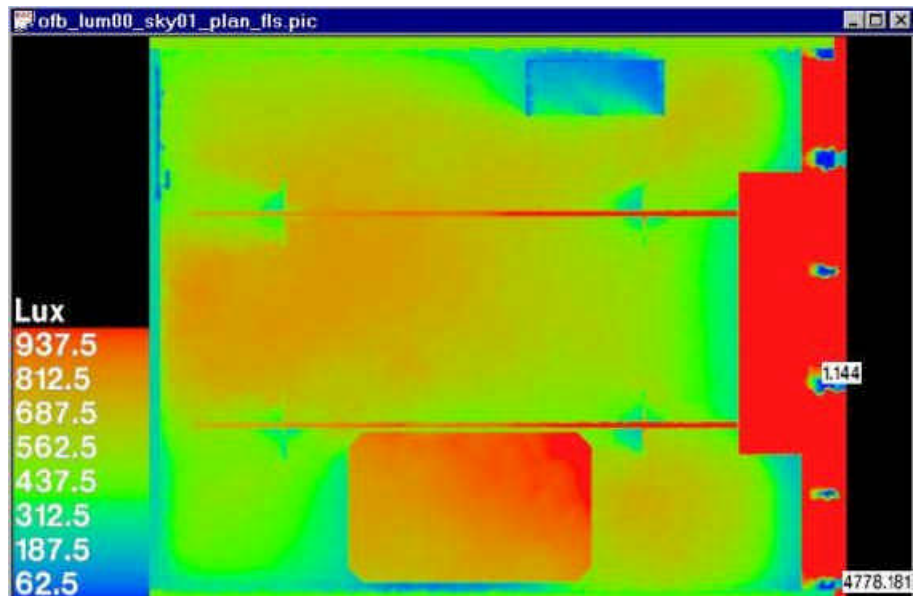See **Luminance vs Illuminance Images.**

Figure 87. Falsecolor image with Show Pixel Extrema selected

Iso Contour

Image Analyzer→Analysis→Iso Contour brings up the Iso Contour Dialog box *(Error! Reference source not found.)*.
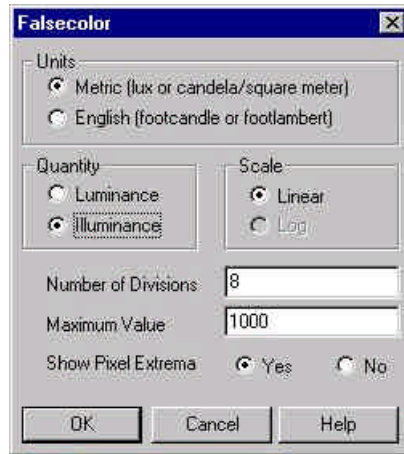

Figure 88. The Iso Contour Dialog box

Iso contour is similar to falscolor. Both output images with quantitative measurements. Iso contour draws demarcation lines in equal steps, according to number of divisions specified, between zero and the maxium value. Unlike falsecolor, the resulting image will contain colored lines of equal value overlayed upon the true color luminance or illuminance image *(Error! Reference source not found.)*. When applied to a luminance image, iso-contour outputs (Metric) candela/m^2 or (English) footlamberts. When applied to an illuminance image, iso-contour outputs lux or footcandle. The number of divisions sets the number of intermediate, equally spaced values between zero and the maxium value that will be displayed on the legend. Show pixel extrema, if selected, will cause iso-contour to annotate the image pixel with the max and min luminance or illuminance values . Be sure that the selected quantity matches the underlying image type.
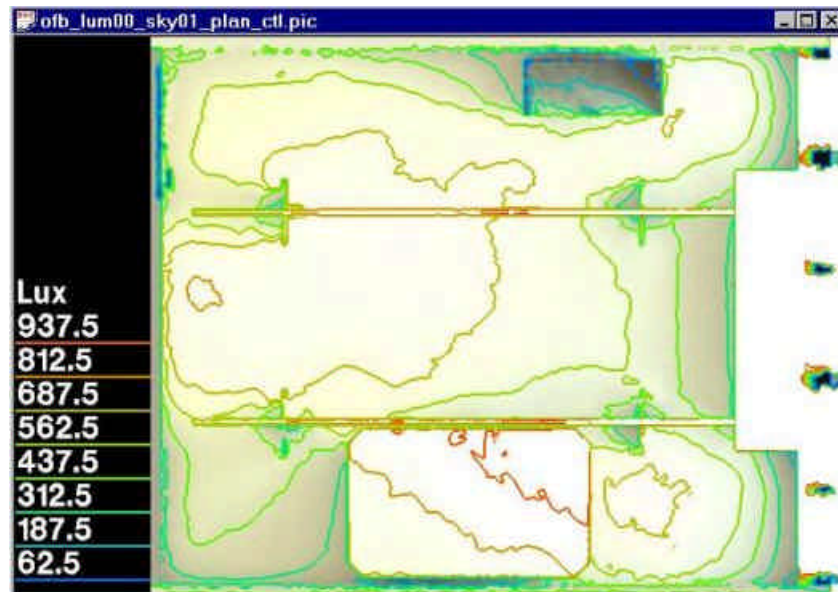

Figure 89. Iso Contour image

Annotate

Image Analyzer→Analysis→Annotate brings up the annotate dialog box. This tool places text on image. Type the annotation text in dialog box, press ok, and an updated image with appear with overlay text.

Window

New Window

Image Analyzer→Window→New Window opens another window of the same image. This allows different parts of the image to be viewed simultaneously, or for different analyses to be performed and compared side by side.

Cascade

Image Analyzer→Window→Cascade displays all open images in a cascading fashion.

Tile

Image Analyzer→Window→Tile tiles all open drawings.

Arrange Icons

Image Analyzer→Window→Arrange Icons lines up minimized image icons at the bottom of the winimage window.

Interactive Rendering (*Winrview*)

Introduction

Desktop Radiance allows for real time, interactive rendering. The image pixels progressively refine on the screen and start to give you an idea of what the scene will look like. ***Winrview* is not meant to be a high resolution rendering tool but more for determining viewpoints and validating scene geometry** (make sure window normals are correct, furniture not floating in midair, walls meet, etc). The *winrview* interactive rendering is the default mode for camera simulations. To produce high quality images, select Batch mode in the Camera Simulation Setup box.
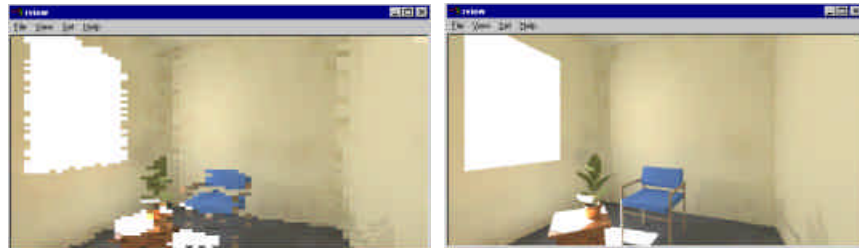

Figure 90. The winrview window during rendering (right) and after rendering (right).

File

Append View to RIF file

This function saves the current view information as text into a specified .rif file in the project directory which can be used for a subsequent rendering. A RIF file is not an image and cannot be opened in the Image Analyzer or winrview. But a reference to the view information saved within a .RIF file may be used in a later rendering or simulation. This tool suppliments the **Define Camera Position** command inside of Desktop Radiance/Graphic Editor. After starting an interactive rendering (winrview), you can use Set → View or the sliders to set up a different view for later use. When you are satisfied with the view, goto File → Append View to rif file. You will the see a browser window with RIF files listed (Figure 91*).*
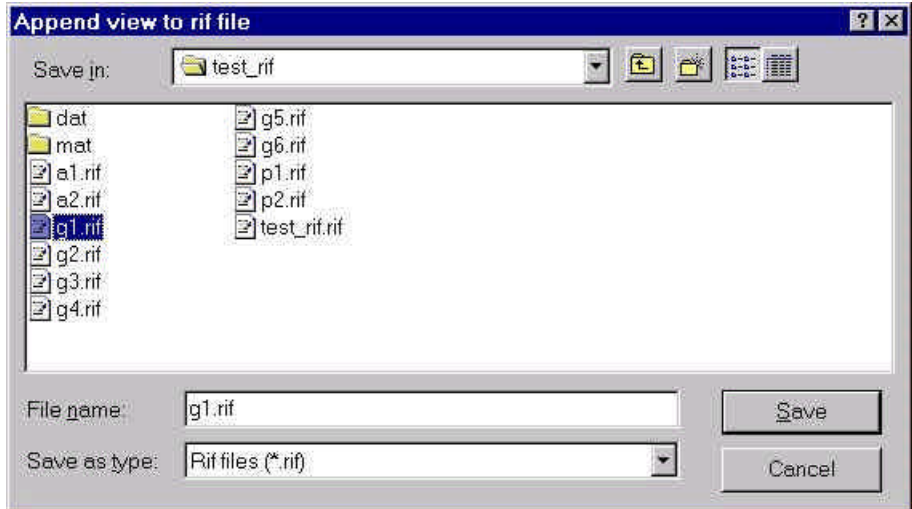
Figure 91. Browser for Append view to rif file

Select a .rif file (possibily the one which started this current simulation), then input a view name such as *plan*. **No spaces allowed for this name** (*Figure 92*).

Figure 92. Input View name for "Appending view to rif file" command

Then when prompted to save the *.vf* file, type the same name again follwed by the *.vf* extension, in this case, *plan.vf* (*Figure 93*).
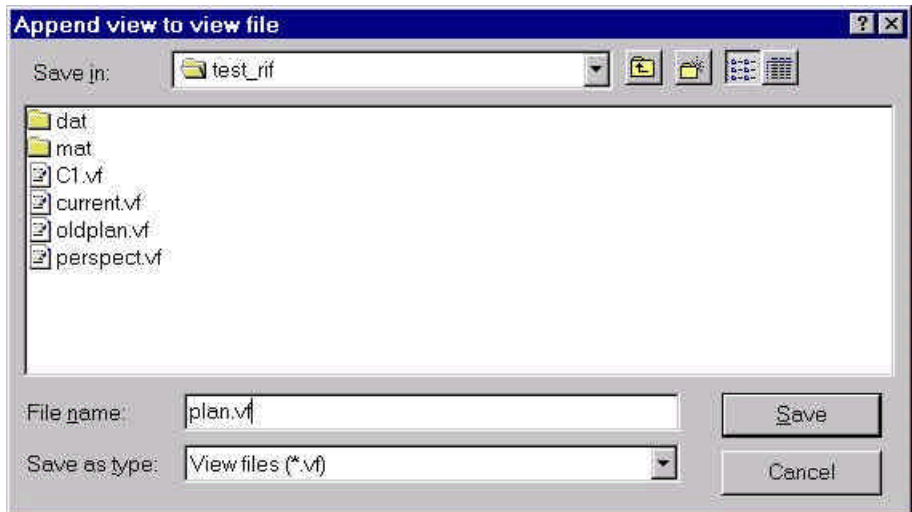

Figure 93. The Append view to view file browser

You can use the views you have appended to a RIF file in subsequent scenarios by duplicating the scenario matching the RIF file which has appended the new view information.

Append View to view file

This function saves the view information into a .VF file in the project directory. A .VF file is a text file and cannot be opened in the Image Analyzer Program. It can be loaded by winrview or rad in subsequent simulations.

Load view from RIF file

This function allows you to select and load into *winrview* a view previously saved to a RIF file. Access this by going to File → Load View from rif file. In the browser, select the RIF file which contains the saved view definition (*Figure 94*).
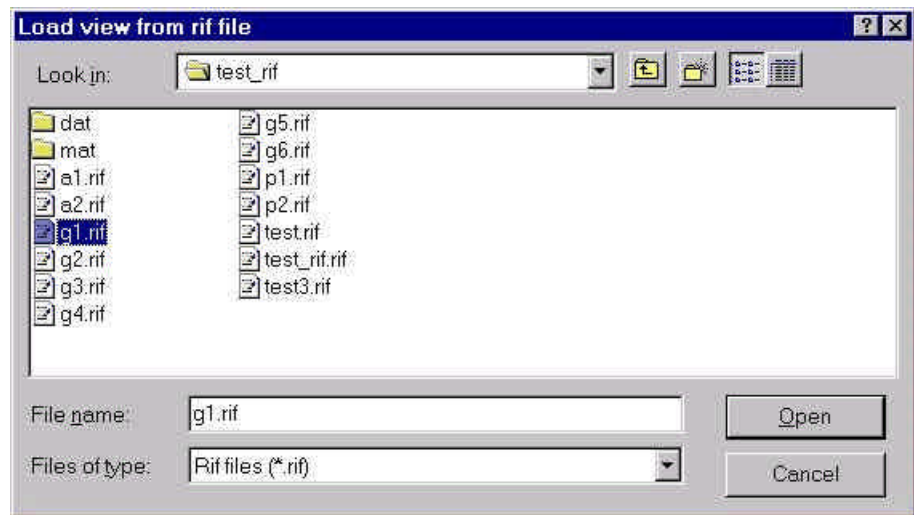

Figure 94. Browser for Load view from rif file

After selecting the rif file, you will be shown the available views (*Figure 95*). Select one, click ok, and you will return to *winrview* and begin to render the selected view of your scene.
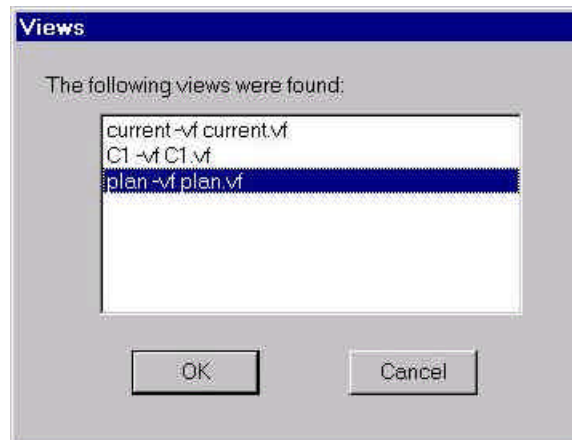

Figure 95. Available views in the selected rif file

Reusing saved views for batch mode simulations:

At the simulation manager dialog box, select a desired scenerio to **duplicate**. (Duplicate means to start another simulation of the same geometry, but with possibly different rendering parameters). You will be prompted to give another unique scenerio name so the duplicated parameters can be kept separate from the original rendering. In the pulldown combo box for **Camera Name** select the view name. Click **batch** for the simulation mode, and a batch rendering (rpict) will start up in the background using the saved view.

Load view from view file

This function allows you to choose and load a VF file into the interactive renderer.

Save Image

Saves the image as a .pic file. This type of file can be opened in the Image Analyzer program.

Save Image As

Allows you to save an image as a .pic file. A pic file can be opened in the Image Analyzer. The default location for a pic file is in the project file of your drawing.

Save Log File As

View Log File

The log file is created after you trace a ray in *rview*. The log file records all rays traced and all data associated with the ray.
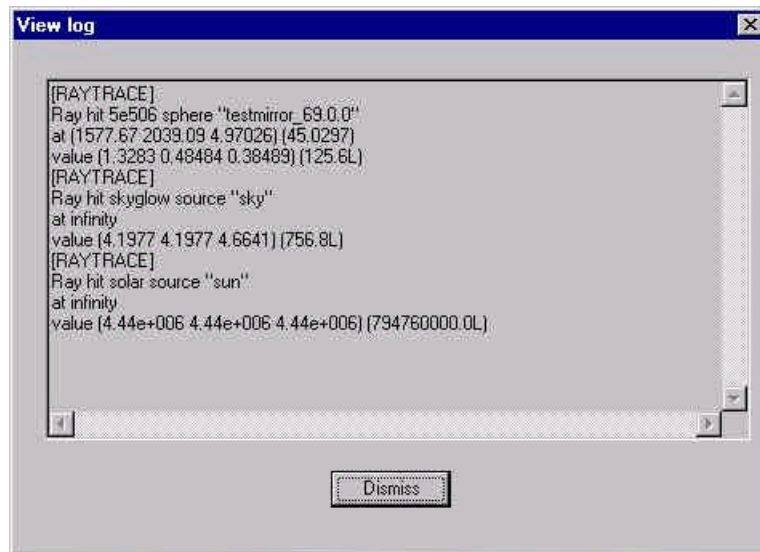

Figure 96. The View Log dialog box

Exit

Upon exiting *rview*, it will ask if you want to save the image. If you click YES you will be able to save the image as the default name given in the default location or as another name in a location you choose. Clicking NO will close *winrview* and not save the image.

View

This menu allows you to display or hide the *winrview* tools. The Toolbars include: the command bar, the roll/pitch bar, the status bar, the main toolbar, and the yaw/translate bar. All the toolbars except the Status bar can be rearranged on the *winrview* dialog borders.

Figure 97. The winrview window with all command bars visible

Command Bar

This is a small edit box which allows you to access some of the legacy features of *rview*.

Figure 98. The Command Bar edit box

You can type in commands for *winrview* and press <enter>. The available commands can be found under the *rview*® Help→Commands pull down menu. More information on the commands, how to use them, what do they do, may be found at: http://radsite.lbl.gov/radiance/man_html/rview.1.html

Figure 99. The available commands that can be used on the command bar in rview.

Roll/Pitch Bar

These sliders control the rotation of the camera in *winrview* to the right, left, up, and down. Roll adjusts rotation to the right or left around a horizontal axis perpendicular to the view plane of the current view. Moving the slider up will roll the camera to the right, moving it down will roll the camera to the left. Pitch adjusts rotation up and down around a horizontal axis parallel to the view plane. Moving the slider up will rotate the camera forward/up and moving the slider down will rotate the camera forward/down.

Figure 100. The Roll Pitch Bar

Status Bar

This is found near the bottom of the *winrview* screen. The status bar indicates the progress of the rendering. When the rendering process is finished the status bar will display "Ready". When you first begin a rendering with high accuracy, the status bar may display "Calculating initial ambient values. Wait…" This indicates that *winrview* is busy even though few pixels may be displayed.
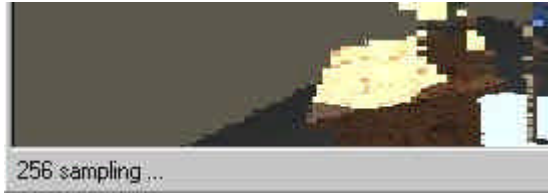
Figure 101. The winrview Status Bar

Tool Bar

The main toolbar contains six different tools *(Figure 102)* that are useful in formatting your *winrview* screen to best fit your needs and analysis objectives.

Figure 102. The main toolbar in rview

"**E**" adjusts the exposure. This effects how light or dark your *winrview* image is. For more on this see **Exposure**.

"**F**" allows you to frame an area of the *winrview* image for refinement. For more on this see **Frame**.

"**N**" redraws or regenerates the *winrview* image. This is sometimes necessary if you have changed several parameters or settings in *rview*. For more on this see **Redraws** a New image**.**

"**P**" allows you to adjust certain image parameters in rview. For more on this see **Winrview Parameters Dialog** box.

"**T**" allows you to ray trace. For more on this see **Ray Tracing**.

"**V**" allows you to adjust and set the *winrview* view. For more on this see **Set View**.

Yaw and Translate Bar

The Yaw tool turns the view about the Z axis to the right or left. Adjusting the Yaw slider to a smaller number makes it turn left, and a larger number turns the camera to the right.
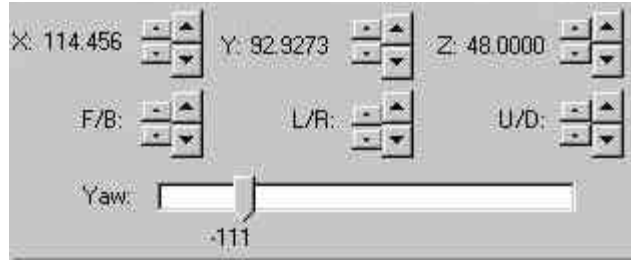
Figure 103. The Yaw and Translate Bar

The X,Y, and Z spinners move your viewpoint position along the X, Y, and Z axes. The larger spinners move the viewpoint in larger increments. The smaller spinners move the viewpoint in smaller increments. To adjust the increments that these spinners set with see **GUI Increments**.

The spinners labeled F/B, L/R, and U/D move the viewpoint from it's relative position and angle, as opposed to along an axis which the X,Y, and Z spinners do.

The **F/B** spinners move the viewpoint **forward and backward**. The up pointing spinners move the viewpoint forwards. The down pointing spinners move the viewpoint backwards.

The **L/R** spinners move the viewpoint to the **left and right**. The spinner pointing up moves the viewpoint to the left. The spinner pointing down moves the viewpoint to the right.

The **U/D** spinners move the viewpoint **up and down**. The spinner pointing up moves the viewpoint up. The spinner pointing down moves the viewpoint down.

Set

This menu item allows you to turn on and off certain features of *rview*. SET also provides another way of accessing some commands that are found on the main *winrview* toolbar.

Backface Visibility

This tool turns on and off the walls whose surface normal is pointing away from your viewpoint.

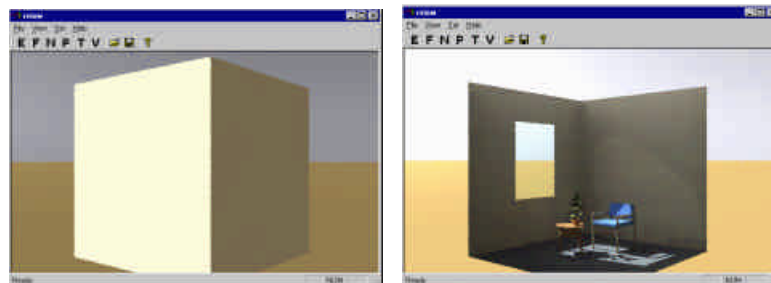*Figure 104. Without backface visibility (left) and with (right).*

This tool is useful when you wish to see through the near side of a building. With one camera on the outside both the inside and outside of a building can be easily viewed instantaneously in *rview*. For this tool to work, the surface normals of the wall surfaces must be oriented toward the inside of the building. This tool turns off

the wall surfaces whose surface normal is pointing away from the viewpoint. For more information on orienting surface normals see **Adjust Normal Orientation** in the Graphic Editor section**.**

Greyscale

This tool renders the image in black, white, and graytones.

Irradiance

If selected, *winrview* simulates and calculates the Illuminance in the model. Reflectance of materials is not taken into account for the very last bounce of light from the surface to the view point. The total amount of light that reaches each surface in your model is calculated and displayed.
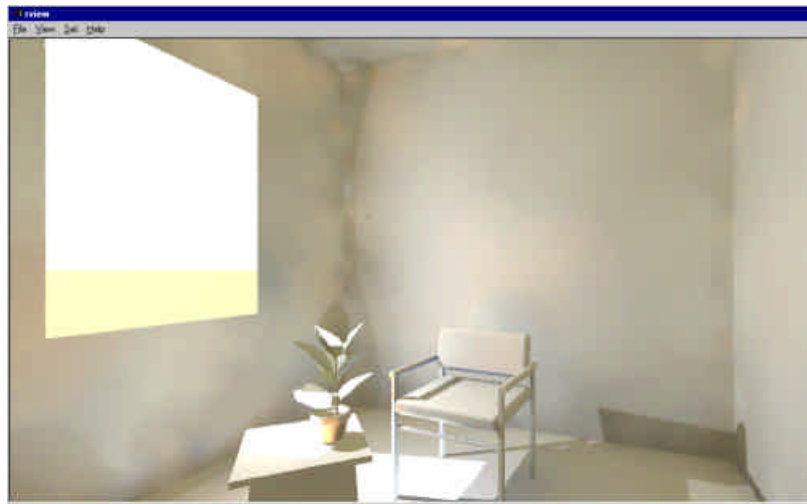

Figure 105. An irradiance image

See related topics on **The Radiance RGBE Format** or **Luminance vs Illuminace Images**.

GUI Increments

The set GUI increments dialog allows you to adjust the increments that spinners and sliders are set for. The major spinners and sliders are meant to be set with relatively large increments. These allow you to move the view in large segments at a time. The minor spinners and sliders are meant to be set with relatively small increments. These allow you to fine tune the position of your view once you have moved the majority of the distance with the major spinners and sliders.
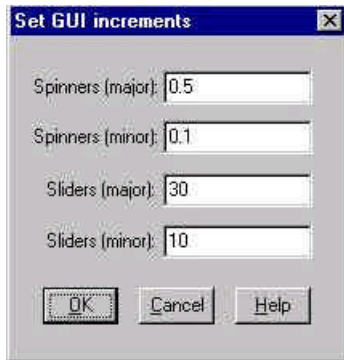
Figure 106. The Set GUI increments dialog box

Exposure

E When using the exposure tool, the higher the setting, the brighter the image will be. When "Relative Mode" is selected, the exposure will be set relative to your choice of either a point that you select in the image or relative to the average value in the image.

Figure 107. The winrview Exposure tool

Frame

F This tool allows you to frame a section of an image for refinement. After clicking on "F" you are prompted to select an area for refinement. Use the cursor to drag a box around an area of the image. To select the entire image, draw a box around the entire *winrview* window. There is no frame all command as in previous Unix versions of *rview*.

Redraws a New image

N This tool redraws/regenerates a new image. This is sometimes necessary if the image has been corrupted by other dialog boxes, or if you have significantly changed your calculation parameters and want to start over.

Winrview Parameters Dialog box

P The *winrview* parameters define the level of accuracy for the simulated image. The settings in this dialog box will determine if your model will simulate an image quickly or more slowly to a high level of accuracy. **NOTE: if you want a highly accurate image, use batch mode instead of interactive.** In the *winrview* parameters dialog box you can manipulate things such as the number of ambient bounces that should take place. For information on choosing recommended values for *winrview* parameter settings see the Desktop Radiance User Manual→Tips and Techniques→Setting Rendering Options. This table will give you minimum, maximum, fast, and accurate values. In addition it tells you particular settings that can greatly affect the rendering time of your model.

Ambient Parameter Tab

The Set Parameters→**Ambient** dialog box *(Figure 108)* below sets the parameters for the ambient light in the scene. To access the Ambient Parameters dialog box go to rview→Set→Parameters and click on the AMBIENT tab.
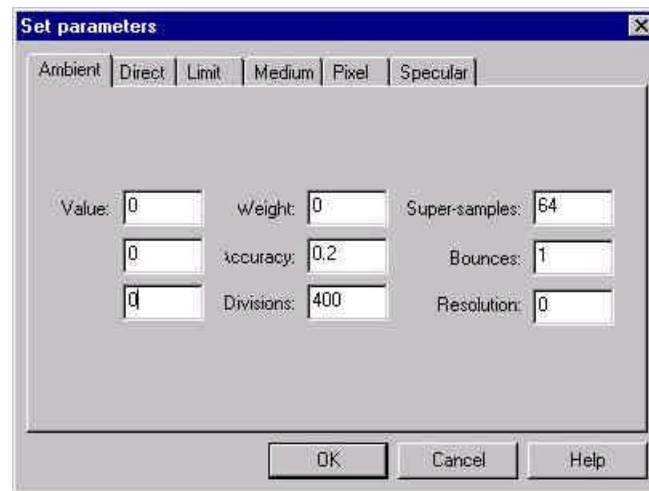

Figure 108. The Ambient Tab in the Parameter Dialog Box

Value: three boxes representing red (top), green (middle), and blue (bottom). Increasing these values evenly can make the scene darker, decreasing them will make it lighter.

Weight: the average weight of the indirect light. As new indirect lights are computed the average value will be modified. For a scene that includes indoor and outdoor spaces, a value of zero is appropriate and is the default.

Accuracy: the percent error allowd in lighting calculations. The smaller the number, the smoother the rendering. A value of 0.3 is a reasonable level to begin with. The range of possible values that can be entered is between 0 and 0.5. Lower numbers are more accurate.

Divisions: the number of divisions of the hemisphere in the ambient lighting monte carlo calculation. A value of zero implies no indirect calculation. A reasonable value to begin with is 128. The range of possible values that can be entered is between 0 and 4096. Higher numbers are more accurate.

Super-samples: specifies the maximum number of additional rays to be traced per ambient division. Where there is a big difference in value from adjacent rays. A reasonable value to begin with is half of the ambient divisions. The range of

possible values that can be entered is between 0 and 1024. Higher numbers are more accurate

Bounces: the number of diffuse bounces that will be computed by the indirect calculation. To have no indirect calculation, enter a value of zero. For a medium quality rendering, a value of 2 or 3 is reasonable. The range of possible values that can be entered is between 0 and 8. Higher numbers are more accurate. If your *winrview* rendering first appears very flat and shadowless, a low value for the ambient bounces setting is usually the cause.

Resolution: specifies the density of ambient calculation points. A value of zero means that an ambient point is computed for each pixel. A reasonable value to begin with is 12.

Direct Parameters Tab

The Set Parameters→**Direct** Dialog Box *(Figure 109)* sets the parameters for the direct light in the scene. To access the Direct Parameters dialog box, go to rview→Set→Parameters and click on the DIRECT tab.
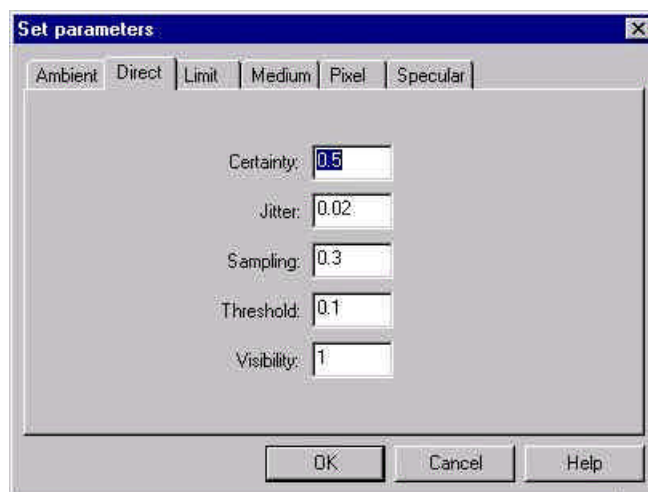

Figure 109. The Direct Parameters Dialog Box

Direct-Certainty: value of one guarantees that the absolute accuracy of the direct calculation will be equal to or better than that given in the *Direct® Threshold value*. A value of zero insures that all shadow lines resulting in a contrast change greater than the specified *Direct® Threshold value* will be calculated. A reasonable value to begin with is 0.25. The range of possible values that can be entered is between 0 and 1. Higher numbers are more accurate.

Direct-Jitter: controls the smoothness and accuracy of penumbras or soft shadows. A value of zero means that shadows will be rendered without penumbras and a value of 1.0 will maximally sample large area sources to provide the smoothest possible penumbras.

If direct jitter is greater than 0.0 then pixel sampling must be 1.0. A good value to use for direct jitter is .67 when smooth shadows are desired. This parameter can greatly increase rendering time so use with caution. A reasonable value to begin with is 0.02. The range of possible values that can be entered is between 0 and 1. Higher numbers are more accurate.

Direct-Sampling: subdivides a light source until the width of each sample area divided by the distance to the illuminated point is below this ratio. This assures accuracy in regions close to large area sources at a slight computational expense. A

value of zero turns source subdivision off, sending at most one shadow ray to each light source. Large area sources are subdivided into at most 64 patches which can lead to "hot spots" on immediately adjacent surfaces.

Direct-Threshold: minimum light value that a light source must have to be tested for shadows. A value of zero means all light sources will be tested for shadows. A reasonable value to begin with is 0.2. The range of possible values that can be entered is between 0 and 1. Lower numbers are more accurate.

Direct-Visibility: allows you to make light sources appear black when looked at directly, but light output will still be taken into account for the simulation and analysis. A value of zero will turn off the light source visibility. Any number greater than zero will turn it on.

Limit Parameters Tab

To access the Limit Parameters dialog box *(Figure 110),* go to *rview®* Set→Parameters and click on the LIMIT tab.
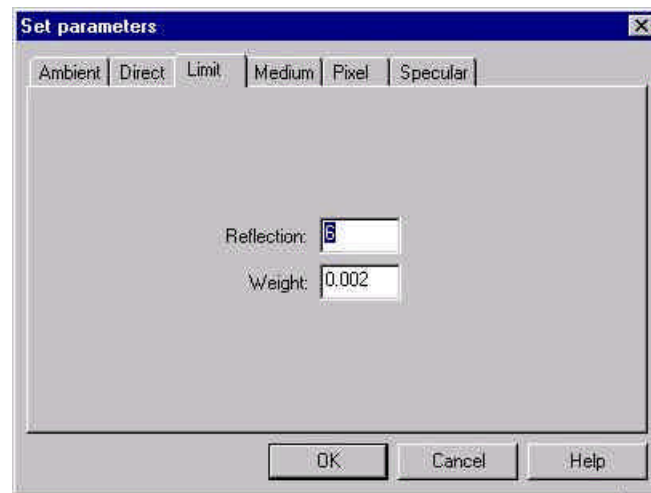

Figure 110. The Limit Parameters Dialog Box

Limit-Reflection: defines the maximum number of specularly reflected and refracted rays that can be spawned for each initial view ray. A reasonable value to begin with is 6. The possible range of values that can be entered is between 0 and 16. Higher numbers are more accurate.

Limit-Weight: the weight function stops the generation of specular rays when the potential contribution is less than the specified minimum value. If the amount measured is less then the specified minimum weight, additional rays will not be traced. A reasonable value to begin with is 0.02. The possible range of values that can be entered is between 0 and 0.05. Lower numbers are more accurate.

Medium Parameters Tab

Parameters in the Medium tab affect the way light is traced through "participating media" such as mist or fog. Volumes of participating media must be modeled with the appropriate Radiance material. Such materials are not yet available in Desktop Radiance.

To access the participating Medium Parameters dialog box *(Figure 111)*, go to *rview®* Set→Parameters and click on the MEDIUM tab.
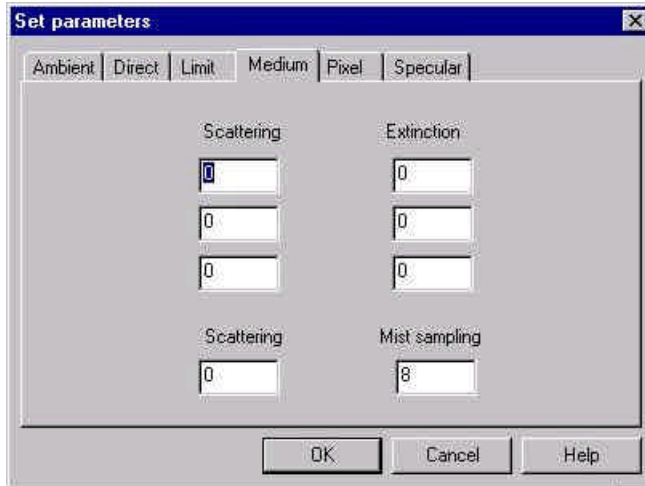
Figure 111. The participating Medium Parameters Dialog Box controls parameters related to the rendering of fog and mist.

Scattering Albedo: determines whether light from a medium is absorbed or scattered. From top to bottom the boxes stand for Red light, Green light, Blue light. Only values between 0 and 1 can be entered. A zero will cause all light not transmitted by a medium to be absorbed. A one will result in all light not transmitted to be scattered elsewhere.

Extinction Coefficient: refers to the distance that light will be scattered or absorbed. The three boxes from top to bottom stand for red light, green light, blue light.

Scattering Eccentricity: defines how much light scattering will tend towards the forward direction. Only values between 0 and 1 can be entered. A value of one will result in the most forward tending light scattering.

Mist Sampling Distance: defines the distance between samples taken during a source scattering. A value of zero means that only one sample will be taken.

Pixel Parameters Tab

To access the Pixel Parameters dialog box *(Figure 112)*, go to *rview®* Set→Parameters and click on the PIXEL tab.
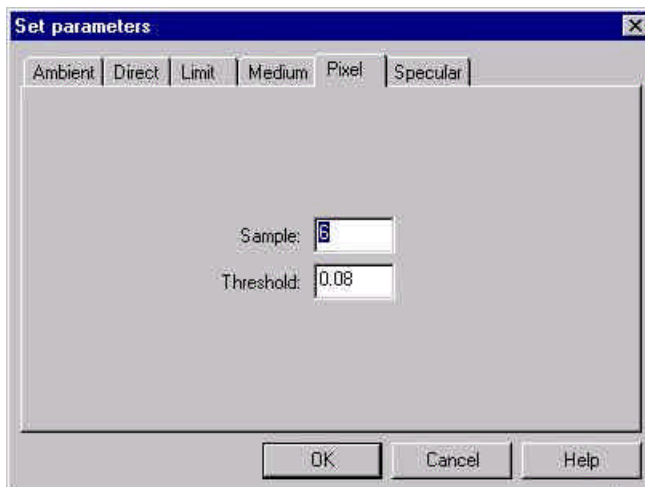

Figure 112. The Pixel Parameters Dialog Box

Sample: defines the amount of space in pixels that can be used for subdivisions on the image plane. A reasonable value to begin with is 16. The range of values that can be entered is between 1 and 16. Lower numbers are more accurate.

Threshold: if two adjacent pixel samples differ by more than this amount, a third sample will be taken. A reasonable value to begin with is 0.08. The range of values that can be entered is between 0 and 1. Lower numbers are more accurate.

Specular Parameter Tab

To access the Specular Parameters dialog box *(Figure 113)*, go to *rview®* Set→Parameters and click on the SPECULAR tab.
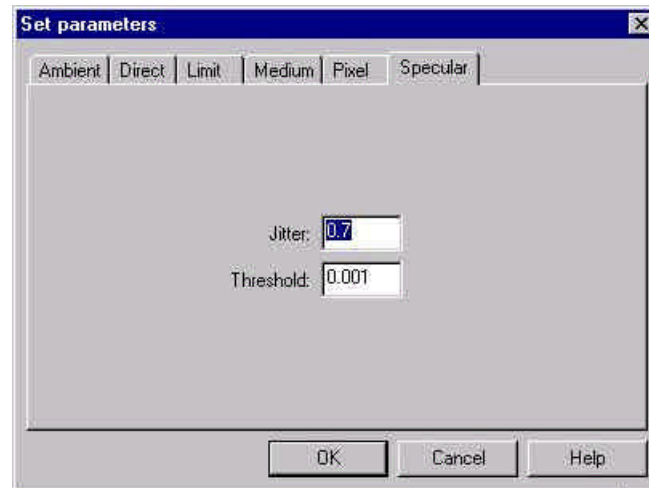

Figure 113. The Specular Parameters Dialog Box

Jitter: the amount that semi-specular highlights will be sampled. A value of zero will turn off specular sampling causing all light reflections to appear sharp. A value of one will make all specular reflections fully sampled allowing for soft reflections. A reasonable value to begin with is 0. The range of values that can be entered is between 0 and 1. Higher numbers are more accurate. Changes in this value have no effect on rendering time.

Threshold: the minimum specularity of materials under which specular sampling is not performed. A value of zero means specular sampling will always take place. A value of one means specular sampling will not take place at all. Values between 0 and 1 will selectively allow specular sampling, for those materials whose specularity is above the specified value. A reasonable value to begin with is 0.001. The range of values that can be entered is between 0 and 1. Lower numbers are more accurate.

Ray Tracing

T You select a point to find the level of luminance or illuminance, depending on the calculation quantity (set→irradiance or set→radiance), in your model at that point.
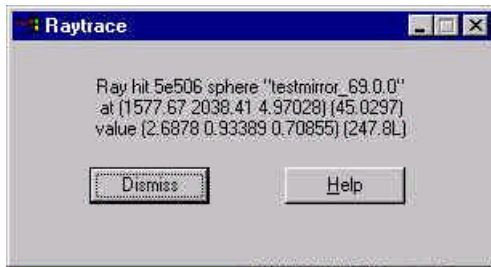
Figure 114. The Raytrace information dialog box

The first line of output provides the name of the material (e.g. 2k217) associated with the surface that the traced ray struck in the model followed by the surface type (e.g. polygon) followed by the surface identifier (e.g. document_53.2.0).

The second line of output provides the location in space that the ray struck (x, y, z coordinates)(e.g. -2.32832 e-010, 79.303, 86.9679) followed by the length of the ray from the camera position to that point (e.g. 117.71) in the units of your model.

The third line of output provides the computed luminance or illuminance value, first in red, green and blue spectral quantities, then in average luminance or illuminance quantity.

If your calculation quantity is set to illuminance, this value will report the illuminance in Lux. If your calculation quantity is set to luminance, this value will report the luminance in nits or candelas per square meter. These units are always displayed in SI units, regardless of the units specified in the preferences dialog box.

The output from tracing rays as well as any error messages generated during the ray-tracing process will be saved to a log file. See **Save Log File As** or **View Log File**.

Set View

V The Set View Dialog Box *(Figure 115)* sets specifications for the view or camera. The settings to specify include: Type, Size, Viewpoint, Clipping Plane, Direction, Up, and Offset.
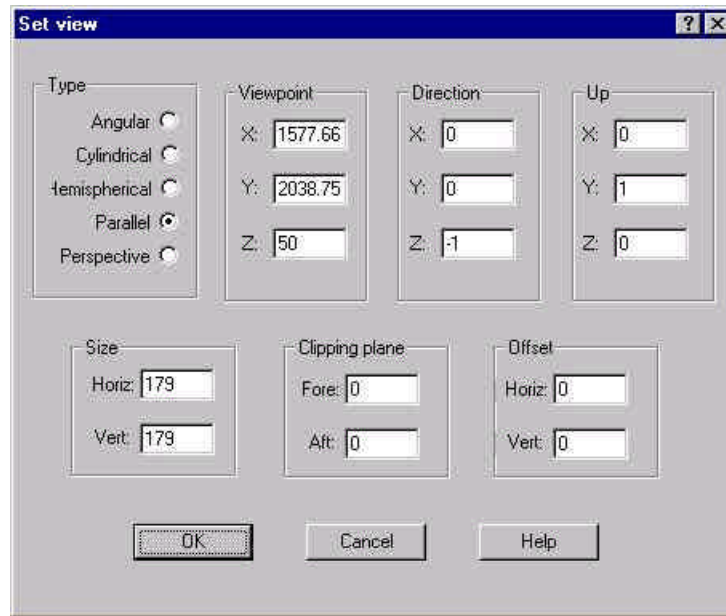
Figure 115. The Set View Dialog Box

Type:

Angular allows for a fisheye view of the model with a horizontal and vertical view size of up to 360 degrees.

Cylindrical gives a view of the model projected onto a horizontal cylinder as is used with quicktime VR applications. The maximum view size is 360 horizontal by 180 vertical.

Hemispherical fisheye views of the model with view size up to 180 degrees.

Parallel gives a flat elevation, section, or plan view of the model. View size is then interpreted in world coordinate system linear units instead of degrees. The view point is interpreted as the center of the image.

Perspective is a standard perspective view of the model from your viewpoint and allows for a view size of up to 179 degrees.

Size:

Horizontal sets the view angle for a perspective or fisheye view. For a parallel view it sets the width of the view in *world units.*

Vertical sets the height of the view window.

Viewpoint:

The *X,Y,Z* coordinates determine the focal point for a perspective view or the center point of a parallel projection image.

Clipping Plane:

This is a plane, perpendicular to your view direction, that cuts through and hides a portion of the image of your model. *Fore* and *Aft* refer to whether what is in front of or behind the view point, respectively, is hidden. The value that is entered in these boxes determines the distance from your viewpoint that the clipping planes are situated. If your image is in a fisheye view then the clipping plane is a clipping sphere and the value entered is the radius of the sphere. The center of the sphere being your viewpoint.

This tool is useful for viewing the inside of buildings by slicing off a wall on one side. A similar effect can be achieved with backface visibility.

Direction:

This tool defines the direction of the *view vector* that creates the view. The X,Y,Z boxes define a point that the view vector will pass through.

Up:

Up is defined by XYZ vectors, with the direction which appears to be the top of the computer screen being up. For example, for a view seen by a person standing and looking straight towards the horizon, the up is along the Z axis, and is defined by X=0 Y=0 Z=1.

Offset:

This tool offsets the view projection up, down, right, and left. A positive Horiz refers to a right offset. A positive Vert refers to a vertical offset.

Help

Commands

This menu item provides you with commands that can be used in the *winrview* Command Bar. For more information and to view the commands, see **Command Bar** .
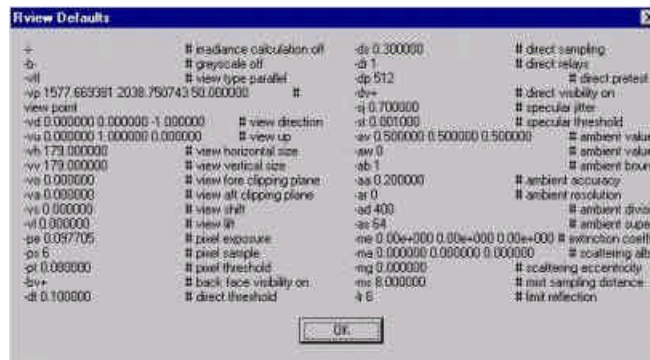
Defaults

Figure 116. The winrview Defaults dialog box