Visual

Release 2.4

Basic Edition User's Guide

www.VisualLightingSoftware.com

Visual User's Guide
© Acuity Lighting Group, 1999-2004, all rights reserved.
U.S. Government users are subject to RESTRICTED RIGHTS.

For the latest updates and corrections to this User's Guide, visit our website at
http://www.VisualLightingSoftware.com

Comments on the User's Guide are welcome at:
support@VisualLightingSoftware.com

This document is provided by Acuity Lighting Group to licensed users of the Visual software product for information purposes only and is furnished on an "AS IS" basis; that is, without any warranties, whatsoever, expressed or implied.

Visual and the Visual logos are registered trademarks of Acuity Lighting Group.

Microsoft, Windows, Windows NT, Windows 95, Windows 98, Windows ME, Windows XP and Windows 2000 are registered trademarks of the Microsoft Corporation.

Adobe and Acrobat Reader are registered trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Information in this document is subject to change without notice and does not represent a commitment on the part of Acuity Lighting Group. The software described in this document is furnished under a license agreement. The software may be used only in accordance with the terms of that license agreement.

Table of Contents

Visual License Agreement

CAREFULLY READ ALL THE TERMS AND CONDITIONS OF THIS AGREEMENT BEFORE USING THIS COMPUTER SOFTWARE (THE "PROGRAMS") AND ACCOMPANYING DOCUMENTATION (THE "DOCUMENTATION"). YOUR USE OF THE PROGRAMS IS SUBJECT TO THE TERMS OF THIS AGREEMENT. IF YOU DO NOT AGREE WITH THESE TERMS, YOU SHOULD REMOVE THE PROGRAMS FROM YOUR COMPUTER AND NOT USE THE PROGRAMS. IF YOU RECEIVED THE PROGRAMS ON CD-ROM PROMPTLY RETURN THE CD-ROM (TOGETHER WITH PROOF OF PAYMENT, IF ANY) TO ACUITY LIGHTING GROUP, INC. FOR A REFUND OF ANY AMOUNTS YOU HAVE PAID. ONCE YOU HAVE USED THE PROGRAMS, YOU WILL BE DEEMED TO HAVE ACCEPTED THE TERMS OF THIS LICENSE AGREEMENT.

1.0   Ownership

The Programs are proprietary products of Acuity Lighting Group, Inc. and its licensors, and are protected under applicable copyright and/or trade secret laws. All right, title and interest in and to the Programs shall remain with Acuity Lighting Group, Inc. and its licensors. This Agreement does not constitute a sale of the Programs, but only conveys to you a limited right to use the Programs in accordance with the terms of this Agreement. Acuity Lighting Group, Inc. and its licensors retain all rights in the Programs not expressly granted.

2.0   License Termination

You are granted a limited, revocable, nonexclusive, nontransferable license to use the Programs on a single computer in accordance with the Documentation. All proprietary notices in or on a Program shall be duplicated by you on all copies of the Program and shall not be altered or removed. Except as expressly permitted herein, you may not alter, modify, copy, disassemble, decompile, reverse engineer, create derivative works from, or sell, sublicense, rent, or otherwise transfer to any other person or entity, the Programs or the Documentation. Your right to use the Programs shall terminate upon your failure to comply with any term or condition of this Agreement. Upon termination of the licenses granted herein, you must cease all use of the Programs and destroy the Programs (including all copies thereof) and all Documentation, and certify to Acuity Lighting Group that all Programs and Documentation have been so destroyed. All other rights and obligations set forth herein shall survive termination of the licenses granted herein.

3.0   Limited Warranty and Disclaimer

THE SOFTWARE LICENSED HEREIN IS LICENSED "AS IS" AND LITHONIA MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, WHICH MIGHT OTHERWISE APPLY TO THE PROGRAMS OR DOCUMENTATION. ALL WARRANTIES AND CONDITIONS, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND THOSE ARISING BY STATUTE OR OTHERWISE IN LAW OR FROM COURSE OF DEALING OR USAGE OF TRADE ARE HEREBY EXPRESSLY DISCLAIMED. Some states or jurisdictions do not allow the exclusion of the implied warranties, so the above exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state. Acuity Lighting Group, Inc. does not warrant that the operation of the Programs will be uninterrupted or error-free, or that they will meet your requirements.

4.0   Limitations

As the user of the Programs, you are solely responsible for the selection of the Programs to achieve their intended results, for the installation and use made of the Programs, and for the results obtained from the Programs. The Programs are intended to assist with lighting design and are not a substitute for independent lighting analysis and testing for lighting safety and suitability. IN NO EVENT SHALL ACUITY LIGHTING GROUP, INC. OR ITS LICENSORS BE LIABLE WHETHER IN CONTRACT OR IN TORT, FOR ANY LOSSES OR DAMAGES WHATSOEVER, (INCLUDING WITHOUT LIMITATION, ANY DIRECT, INDIRECT, CONSEQUENTIAL, SPECIAL OR INCIDENTAL DAMAGES WHATSOEVER (INCLUDING WITHOUT LIMITATION, DAMAGES RESULTING FROM DIFFERENCES BETWEEN MEASURED LIGHTING SYSTEM PERFORMANCE AND LIGHTING SYSTEM PERFORMANCE PREDICTED BY USING THE PROGRAMS, OR DAMAGES FOR LOSS OF BUSINESS PROFIT, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION OR OTHER PECUNIARY LOSS) ARISING OUT OF OR RELATING TO THIS AGREEMENT OR YOUR USE OF OR INABILITY TO USE THE PROGRAMS, EVEN IF ACUITY LIGHTING GROUP, INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT WILL THE TOTAL LIABILITY OF THE ACUITY LIGHTING GROUP TO YOU OR ANY OTHER PARTY FOR ANY LOSSES OR DAMAGES RESULTING FROM ANY CLAIMS, DEMANDS OR ACTIONS ARISING OUT OF OR RELATING TO THIS AGREEMENT OR YOUR USE OF THE PROGRAMS OR DOCUMENTATION EXCEED THE LICENSE FEES PAID FOR USE OF THE PROGRAMS OR $100, WHICHEVER IS GREATER. Some states or jurisdictions do not allow the exclusion or limitation of certain damages. The limitations provided in this License Agreement are intended to apply to the fullest extent allowable under applicable law.

5.0   Export

You acknowledge that the Programs are subject to restrictions and controls imposed by the United States Export Administration Act (the "Act") and the regulations thereunder. You agree and certify that neither the Programs nor any direct product thereof is being or will be acquired, shipped, transferred or re-exported, directly or indirectly, into any country prohibited by the Act and the regulations thereunder or will be used for any purposes prohibited by the same.

6.0   Government Users

The Programs are provided with RESTRICTED RIGHTS. Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013, and in subparagraphs (a) through (d) of the Commercial Computer-Restricted Rights clause at FAR 52.227-19, and in similar clauses in the NASA FAR Supplement, when applicable.

7.0   Miscellaneous

This Agreement shall be construed in accordance with the laws of the State of Georgia. You agree that the exclusive jurisdiction for any claim or action arising out of or relating to this License Agreement shall be filed only in the state or federal courts located in the state of Georgia, and you further agree and submit to the exercise of personal jurisdiction of such courts for the purpose of litigating any such claim or action. This Agreement may not be altered or amended except by a written document signed by an authorized officer of Acuity Lighting Group, Inc. You may not assign this Agreement or any rights or obligations hereunder to any other person or entity without the prior consent of Acuity Lighting Group, Inc..

Should you have any questions concerning this Agreement or the Programs, or the Documentation, please contact Acuity Lighting Group, Inc. by calling (800) 279-8043.

System Requirements, Visual CD Contents

System Requirements

Visual has been programmed for a Microsoft Windows 95/98/ME/XP/2000/NT 4.0 environment. Listed below are the minimum system requirements to successfully run the Visual application.
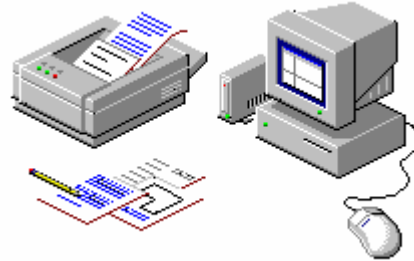
- Microsoft Windows 95/98/ME/NT/2000/XP
- Pentium Processor, 200 MHz minimum
- 25-105 MB Hard Drive space for install depending on installation component choices
- 64 MB RAM minimum, 128 MB RAM or more recommended
- 800x600xSmall Fonts minimum screen resolution, 1024x768xSmall Fonts recommended

Visual CD Contents

- Electronic copies of the Visual User's Guides and Tutorials. The documents are located in the \Manual directory on the CD and are saved in Portable Document Format (PDF). An installation for Adobe® Acrobat® Reader® is included on the CD for cases where a PDF file viewer is not installed on the destination machine.

- Acuity Lighting Group photometric files. These files may be copied to the system hard drive during the installation routine or may be accessed directly from the Visual CD in the \Photometry folder.

  IMPORTANT: Acuity Lighting Group regularly updates photometric databases as products are introduced and/or changed. To download the latest photometric files visit http://www.VisualLightingSoftware.com/Downloads/Photometrics/Photometrics.asp.

- Application typicals. These are a series of pre-configured Visual files intended to show typical applications of the Lithonia Lighting Sportslighting and Emergency products. They may be copied to the hard drive during installation or accessed from the CD in the \Files\Application Typicals folder.

Installation, Registration and Technical Support

Installation

1. Download the setup program from http://www.VisualLightingSoftware.com. Make sure to save the setup program to your hard drive. Run the setup by double-clicking the setup file.

   -or-

   Insert the Visual CD into your CD-ROM Drive. The Visual CD Browser will appear. Select INSTALL VISUAL.

2. The Visual Installation program will begin running. Follow the instructions that appear on your screen.

3. Visit http://www.VisualLightingSoftware.com to check for program news and updates.

Registration

It is important that we keep all users informed of updates for Visual. To register as a Visual user, please create an account on the Visual website: http://www.VisualLightingSoftware.com

Technical Support

For technical support questions, please visit the Support section of the Visual website or contact the Visual Support Center via email or telephone:

- Internet: http://www.VisualLightingSoftware.com
- Email: support@VisualLightingSoftware.com
- Phone: 1-800-279-8043, Monday – Friday 8 AM – 5 PM EST

Document Conventions

Numerous instructions and references appear throughout this guide. The following conventions are designed to make it quick and easy to find and understand information.

- Menu names and items are printed in small caps type. For Example: "Select ARC from the CONSTRUCT MENU."

- Form and Dialog Box names as well as major interface elements are printed in bold type. For Example: The **Options Form** will appear."

- Terms that are defined in the glossary appear in Italics. For Example: "Visual will calculate the *illuminance* level."

- References to keyboard keys appear in 8 point all caps type. For example: "Press the TAB key on the keyboard to change the working plane."

- Input that must be typed into a text or list box in this guide is printed in bold type. For example: "Enter **2.5** into the Workplane Height Text Box."

- Filenames that are referred to are in 10 point all caps type. For example: "Save the file as FOOTBALLFIELD.VSL."

The Visual Basic Edition – Scope, Features and Limitations

Scope

The Visual Basic Edition is specifically targeted at those wishing to quickly develop and document simple interior lighting layouts where uniform horizontal illumination is the primary objective. Designs can be readily developed and analyzed for open interior spaces of rectangular shape with minimal effort. The Basic Edition can also be used to model certain typical aisles and hallways with the appropriate selection of surface reflectances. Direct and intuitive, it enables you to create and modify lighting layouts faster and easier than ever before, so you spend less time on software, more on design.

Features

- Interactively performs automated Luminaire layouts based on required illuminance level, number of Luminaires, Luminaire spacing, and/or unit power density
- Optionally calculates, displays, and prints horizontal point-by-point illuminance values and iso-illuminance contours
- Permits Luminaire layout adjustment by virtue of erase, copy, and move functions
- Photometry is accessible by keyword (Catalog Number, Lamp Type, etc…)
- Luminaires may be placed in either North-South or East-West Orientation
- Includes on-line IES illuminance selection procedure assistance
- Includes on-line light loss factor determination assistance

Limitations

- Restricted to interior analysis of open, rectangular spaces
- Only one Luminaire type may be used at a time
- All Luminaires must be oriented the same way, N-S or E-W
- Horizontal illuminance only

Too limited? Check out the Visual Professional Edition!

Chapter 1
Understanding the Visual Basic Edition Interface

The Visual Basic Edition interface consists of four fundamental elements: The **Lumen Method Tool**, the **Design Environment**, the **Options Form** and the **Print Selection Form**. The following chapter is meant to provide an overview of the basic functionality and graphical layout of each of these program components. Details will be discussed in subsequent chapters.

1.1 The Lumen Method Tool

The **Lumen Method Tool** is the primary design tool of the Basic Edition. It appears when the program is started and is intended to speed the process of designing lighting systems for simple rectangular rooms with a single Luminaire Type. It is ideal for designing classrooms, warehouses, offices and other common rectangular applications. The **Lumen Method Tool** may be used to quickly obtain fixture quantities, spacings, average illuminance, point by point illuminances and power densities.
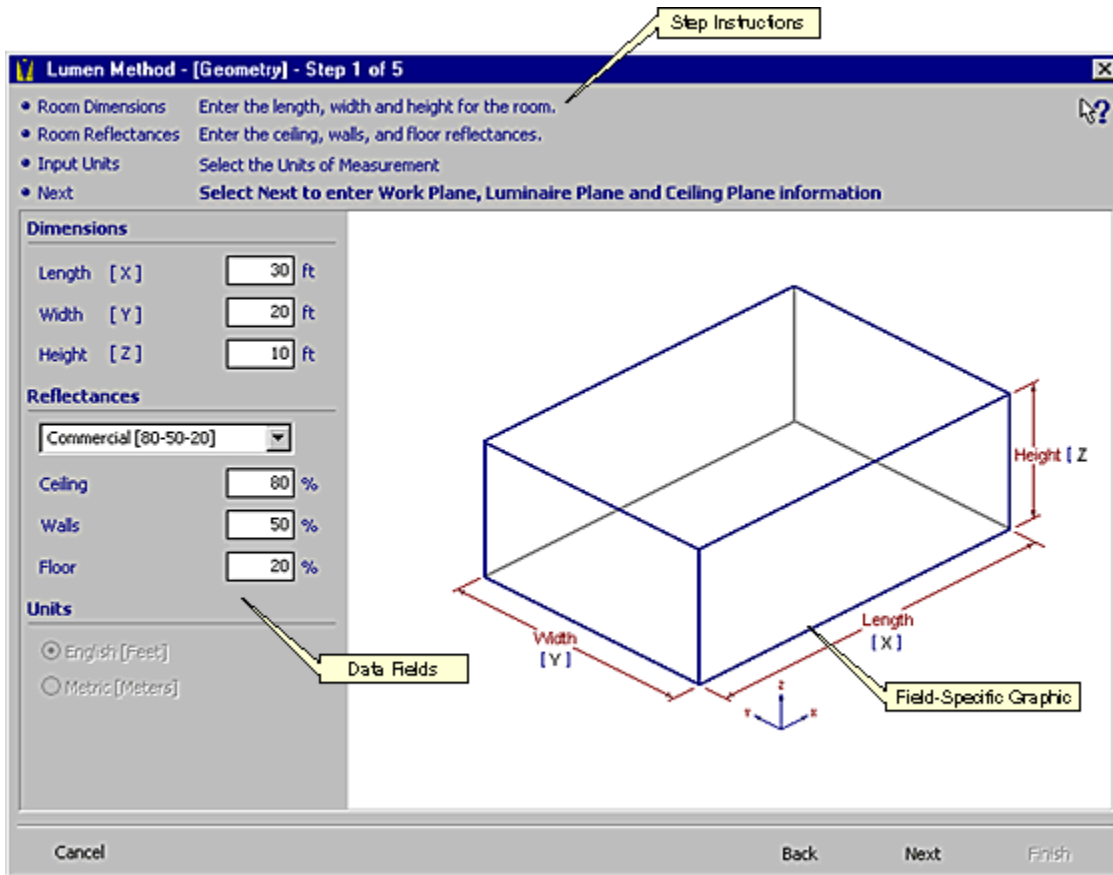
The **Lumen Method Tool** is presented in a wizard format with the familiar BACK, NEXT and FINISH buttons at the bottom of the form to lead the user through the five steps that make up the tool. Specific numbered instructions for each step are displayed at the top of the form. The right side of the form will display graphics that relate to the data fields. For more specific information related to the use of the **Lumen Method Tool**, reference Chapter 2 – The Lumen Method Tool.

1.2 The Design Environment

The **Design Environment** is the central element of the Visual interface and is where most model modification takes place. It also serves as the gateway to the **Print Selection** and **Option Forms**. This is where lighting models are exported from the **Lumen Method Tool** and analyzed to develop a final design. Each region of the **Design Environment** has an explicit function that remains consistent throughout program operation. The purpose of each is outlined below.
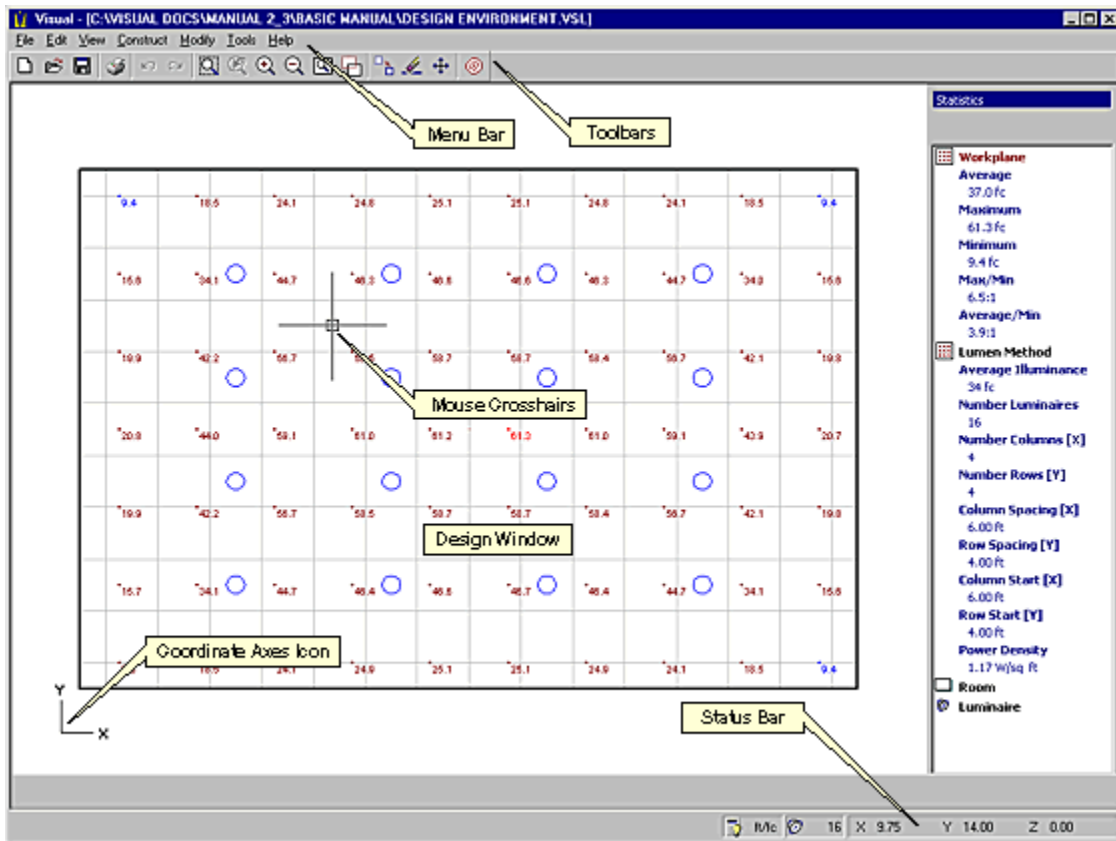
1.2.1 The Menu

As with most Windows$_{TM}$ applications, the menu is the primary means of initiating commands. All Visual commands and parameters can be accessed through the main menu. Upon selecting a menu item, a drop-down menu will appear allowing further selection of the desired command or parameter. The presence of an ellipses (...) following a menu command indicates that the command provides access to a form. The presence of a right-arrow indicates that further command specification is required in the form of a sub-menu. The sub-menu will automatically appear when the mouse cursor is moved over any menu item containing a right-arrow. For more information about menu items, reference Chapter 8 - Menu Commands A-Z.

1.2.2 The Toolbars

The Toolbar is located at the top of the **Design Environment** screen and provide a convenient alternative means of accessing frequently used commands and parameters. The toolbar consists of command buttons that are arranged for ease of identification. To ascertain the meaning of a button, hold the mouse pointer steadily over the button. The command will be immediately identified on the Status Bar and a pop-up description will be invoked at the button location.

1.2.3 The Design Window

The Design Window comprises the majority of the **Design Environment** screen. This is where lighting models are modified, displayed and analyzed. In the lower-left corner of the Design Window is a Coordinate Axes Icon that indicates the orientation and/or direction of the coordinate axes at all times. Think of the Design Window as your view port to the lighting model. There are a number of ways to manipulate the view port. It can be translated (left, right, up, or down) and zoomed in and out. For more information, reference section 3.8 - Choosing a View in Chapter 3 - Getting Around the Design Environment.

1.2.4 The Status Bar

The Status Bar is located at the bottom of the **Design Environment** screen. Always present, it consists of a Command Line, Absolute and Relative Coordinate Displays, Units Indicator and Active Luminaire Counter.   The Status Bar provides information related to the current command, the cursor position within the model space, and the total number of active Luminaires present in the model. The Command line and Relative Coordinates displays are only visible during some commands.
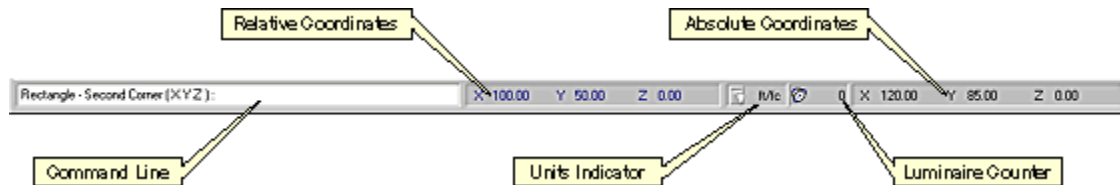
Command Line

The purpose of the Command Line is to provide dynamic textual feedback and allow coordinate entry related to commands during program operation. Once a command has been initiated, the Command Line prompts the user for subsequent information such as coordinate and object selection. In certain cases, numerical coordinate entry is supported and the Command Line will convert to a text entry box to allow such data to be entered manually (as indicated above). For more information, reference section 4.1.3 - Entering Coordinates in Chapter 4 - Model Construction.

Absolute Coordinates

Absolute Coordinates report the exact location (Cartesian X,Y,Z) of the mouse crosshairs within the model space at all times.

Relative Coordinates

Relative Coordinates report the location (Cartesian X,Y,Z) of the crosshairs within the model space relative to a previously selected coordinate. Relative Coordinates are only reported for subsequent coordinate selections and are useful when relative distances are more convenient or intuitive than absolute locations.

Units Indicator

The Units Indicator displays the current units settings for the lighting model. The input units of distance (feet or meters) are displayed first followed by the output units of illuminance (footcandles or Lux).

Luminaire Counter

As the name implies, the Luminaire Counter provides an up-to-date count of the number of active Luminaires present the lighting model.

1.3 The Print Selection Form
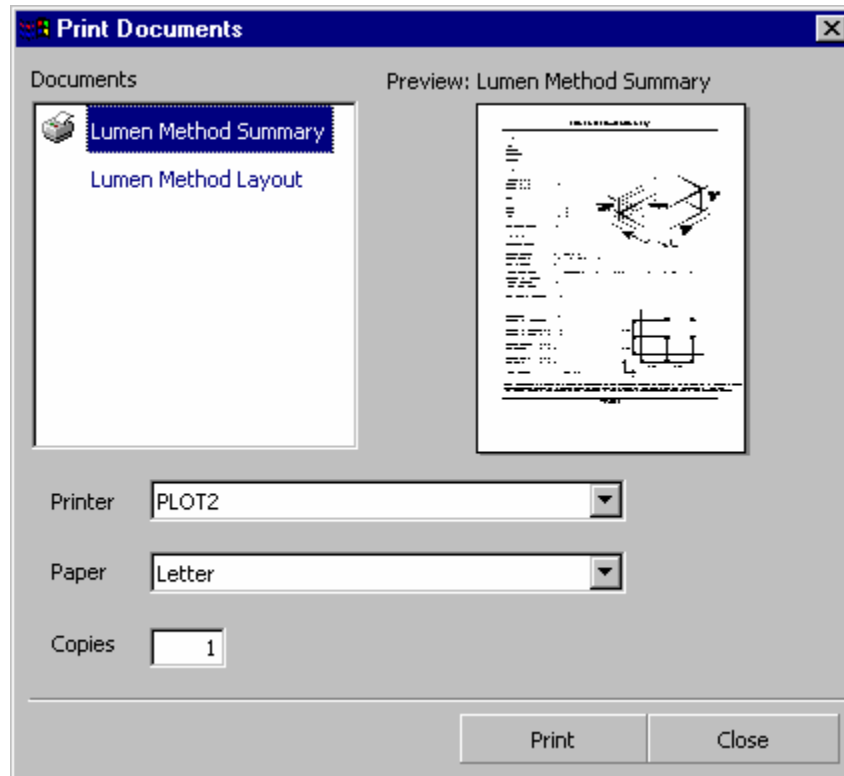
The **Print Selection Form** is accessed through the FILE MENU of the main menu. This is where graphics and other information are compiled to produce the printable results of a Visual Basic Edition lighting model. The user may specify the destination printer, drawing sizes and number of copies for each page of output. For more specific information related to the use of the **Print Selection Form**, reference Chapter 6 - Printing.

1.4 The Options Form
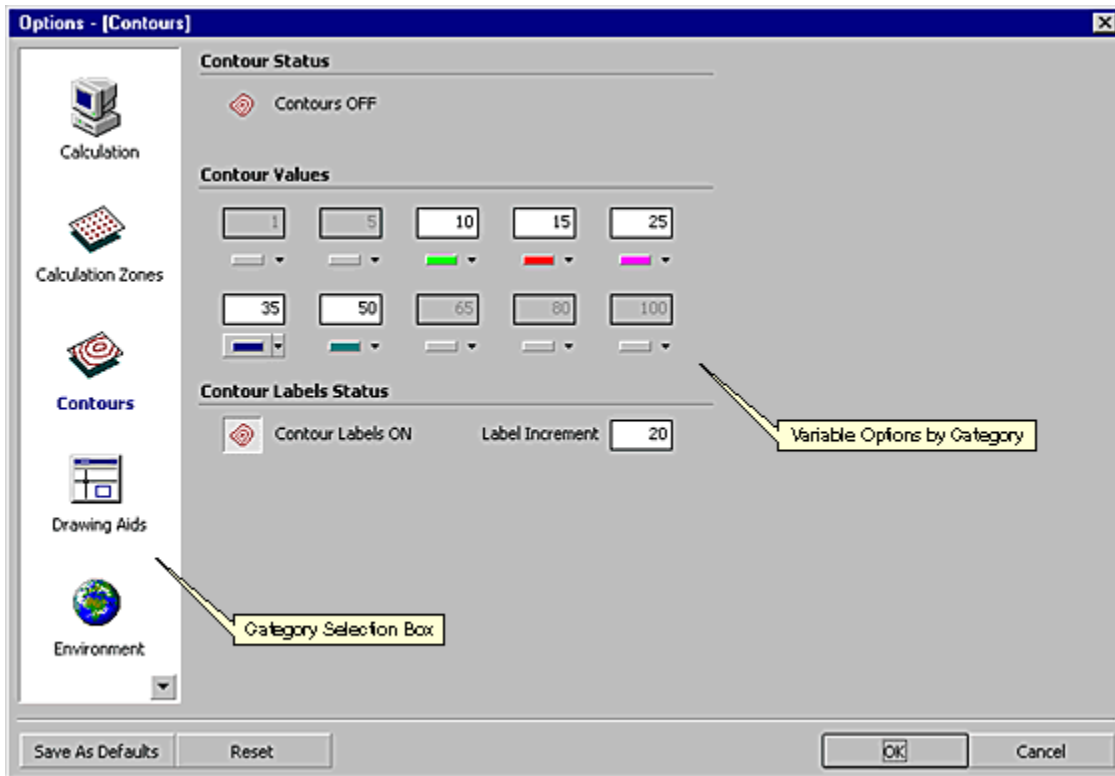
The **Options Form** is accessed through the TOOLS MENU of the main menu. This is where parameters affecting the global operation of Visual reside. The **Options Form** provides a means for customizing the interface to meet specific needs and/or user preferences.   Category selection is made from the Category Selection Box on the left and the available options within each category are presented on the right for editing. Options are logically grouped and labeled for easy identification. Graphics are included where appropriate. For more specific information related to the use of the **Options Form** or any of the Visual options, reference Chapter 7 - Using the Options Form.
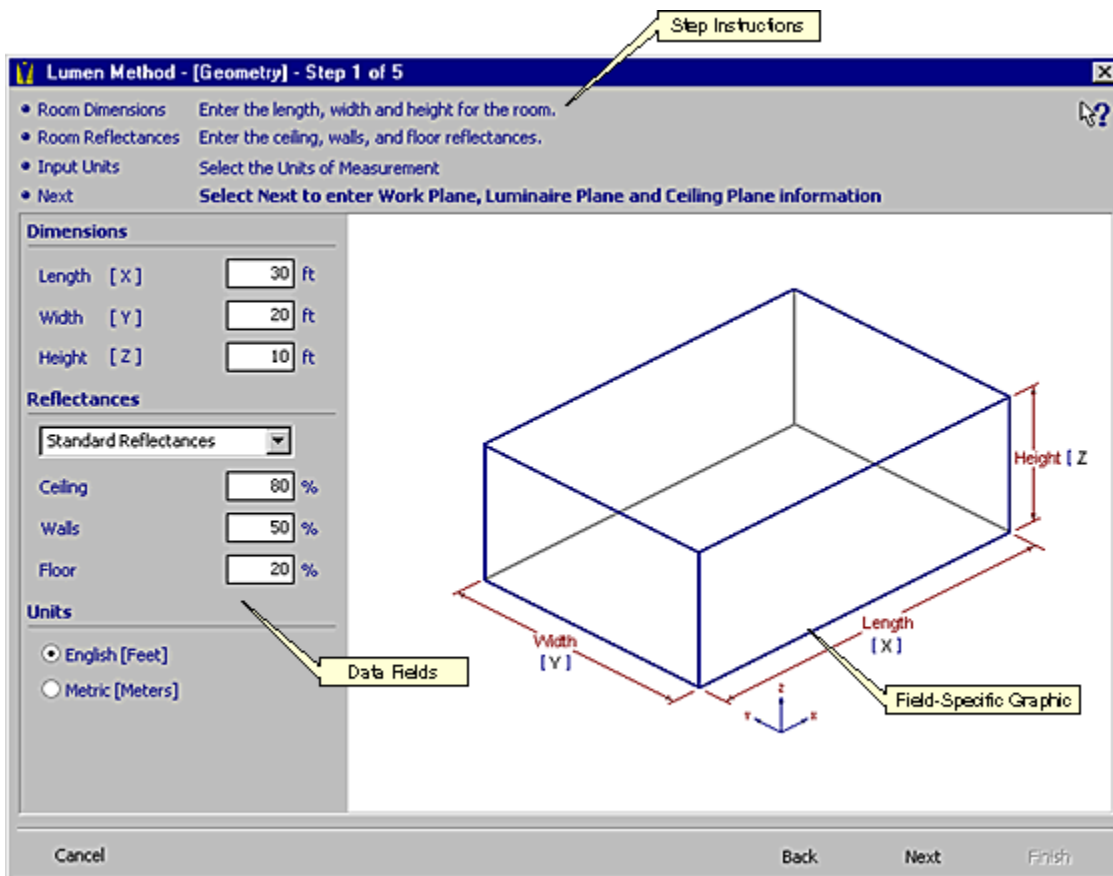
Chapter 2
Design Tools

2.1 The Lumen Method Tool

The **Lumen Method Tool** is a design tool intended to speed the process of designing lighting systems for simple rectangular rooms with a single Luminaire Type. It is ideal for designing classrooms, warehouses, offices and other common rectangular applications. The **Lumen Method Tool** may be used to quickly obtain fixture quantities, spacings, average illuminance, point by point illuminances and power densities.

2.1.1 The Lumen Method Tool Interface

The **Lumen Method Tool** is presented in a wizard format with the familiar BACK, NEXT and FINISH buttons at the bottom of the form to lead the user through the five steps that make up the tool. Specific numbered instructions for each step are displayed at the top of the form. The right side of the form will display graphics that relate to the data fields.

2.1.2 Step 1 – Geometry

1. On the left side of the form, under the Dimensions Header, enter the dimensions (length, width and height) of the room.
2. Under the Reflectances Header, enter the reflectances of the interior surfaces of the room. Either select standard room reflectances from the drop-down list box, or enter the reflectances directly into the text boxes.
3. Select the distance units to be used. The units are defaulted to feet and need not be changed if working in English units.
4. Select NEXT to go on to Step 2.

2.1.3 Step 2 – Planes
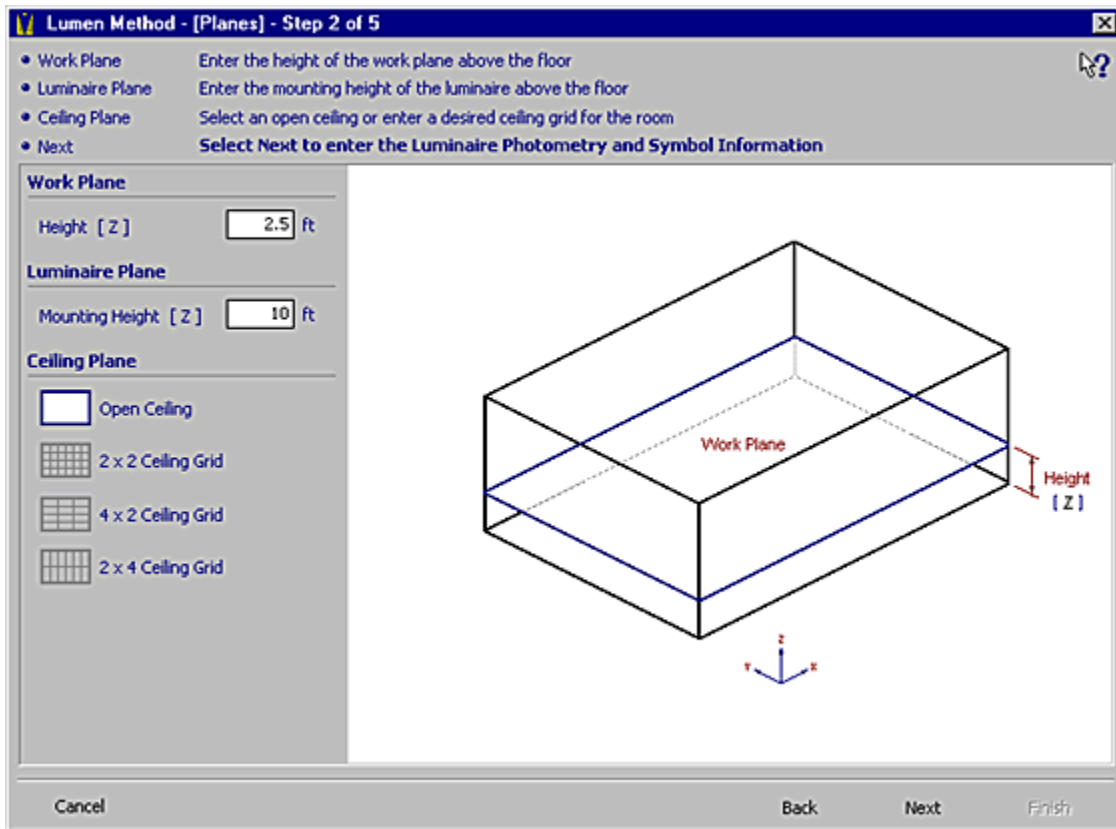
1. Under the Work Plane Header, enter the height of the work plane above the floor. This is plane at which illuminance values will be calculated. Most often the work plane is located at 2.5 feet (desk height) above the floor, the default value.
2. Under the Luminaire Plane Header, enter the mounting height of the Luminaires above the floor. This value is defaulted to the ceiling height, but may be changed to any height that is above the work plane and below the ceiling.
3. Select a ceiling grid from one of the four ceiling grid options.
4. Select NEXT to go on to Step 3.

2.1.4 Step 3 – Luminaire
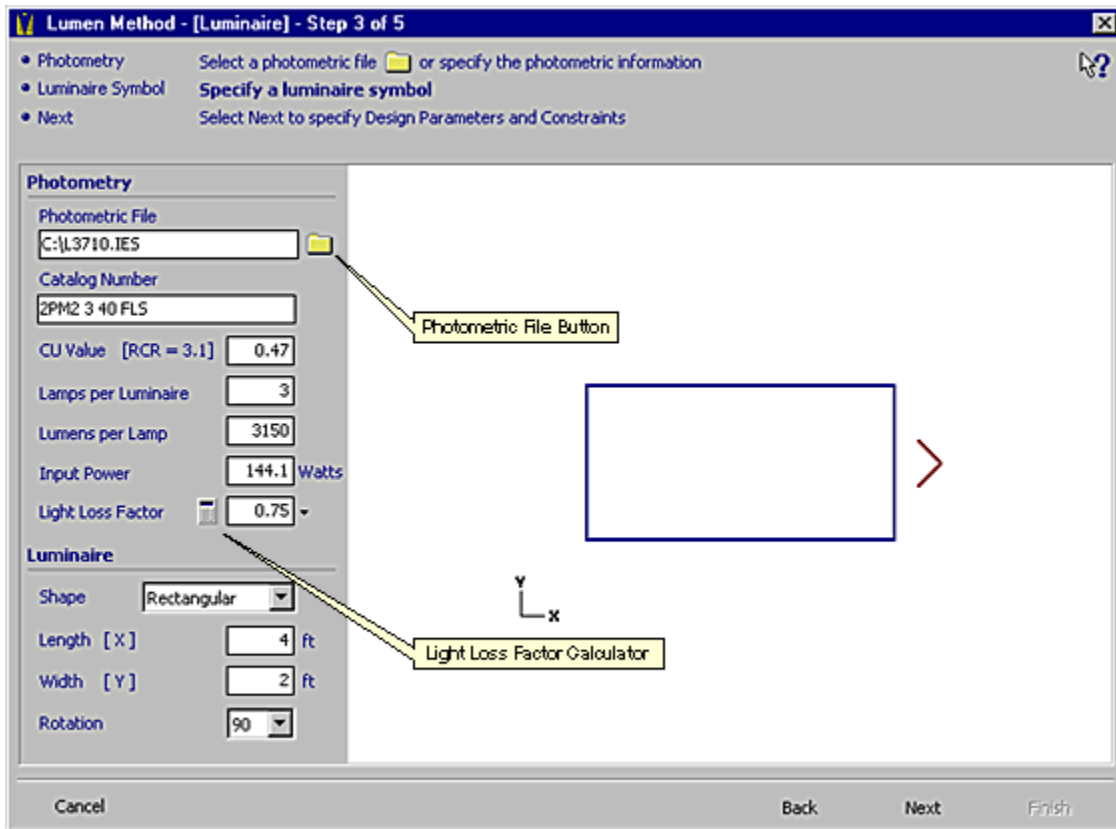
1. Under the Photometry Header, select the PHOTOMETRIC FILE button to launch the **Photometric File Dialog**. Select a photometric file for the Luminaire. For more information on using the **Photometric File Dialog**, reference section 3.3 – Selecting a Photometric File of Chapter 3 – Building a Luminaire Schedule. Once a photometric file has been selected, all the fields under the Photometry Header will be filled out. Alternately, if the photometric file for a Luminaire is not available, the CU (Coefficient of Utilization, found on most cut-sheets), Lamps per Luminaire, Lumens per Lamp and Input Power fields may be filled out to continue with the **Lumen Method Tool**. However, point by point illuminance calculations can not be computed without a photometric file.
2. Enter a light loss factor for the Luminaire. Either select a standard light loss factor from the drop-down list box, enter the factor directly into the text box, or use the **Light Loss Factor Calculator** to compute the factor. For more information on how to use the **Light Loss Factor Calculator** see section 10.2 – The Light Loss Factor Calculator.
3. Specify the Luminaire Symbol. The Luminaire Symbol will be pre-sized according to the luminous dimensions in the photometric file. If desired, the dimensions and the rotation (0 or 90 degrees) of the Luminaire may be changed.
4. Select NEXT to go on to Step 4.

2.1.5 Step 4 – Preliminary Design

Step 4 is an interactive design screen. The design parameters and constraints are entered on the left and the resultant layout is automatically calculated and displayed in the Graphical Window. To the right side of the Graphical Window are the statistics that describe the design.
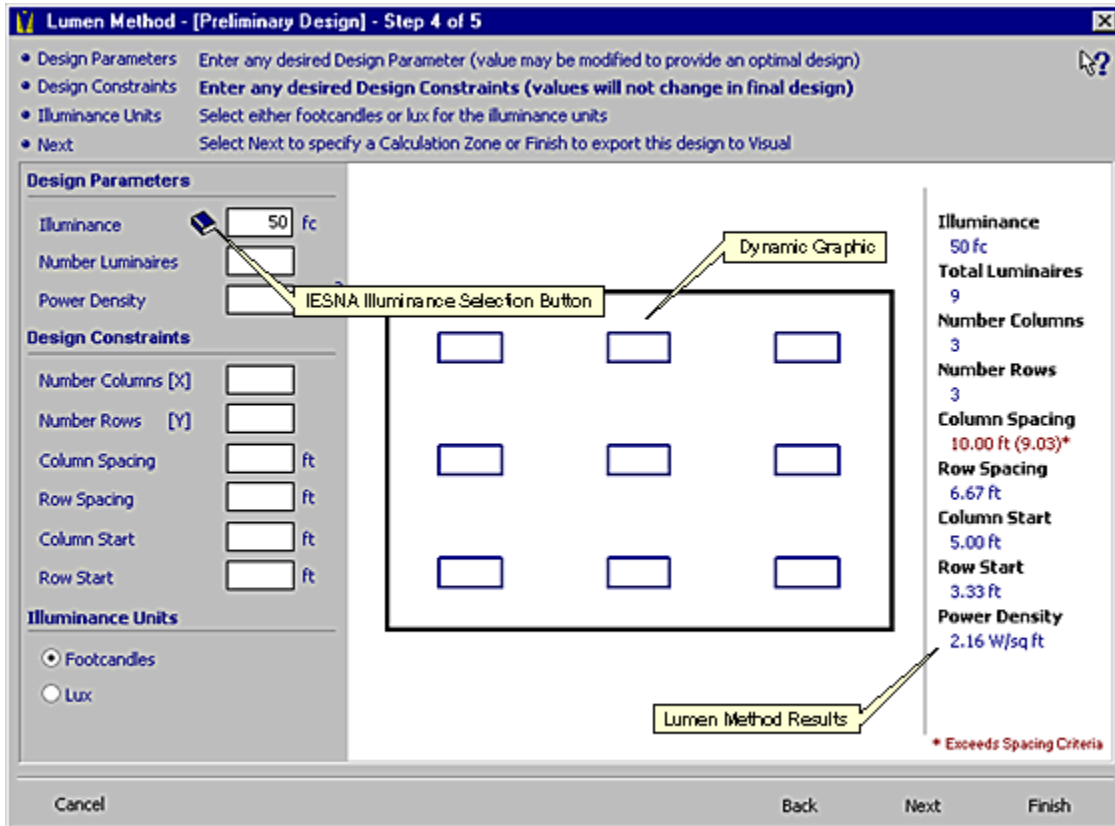
1. Enter a Design Parameter. Parameters are design goals. The **Lumen Method Tool** will compute the logical design that comes closest to satisfying the Design Parameter. If using the illuminance parameter and the desired illuminance is not known, left click on the IESNA Illuminance Selection button to launch the **IESNA Illuminance Selection Tool**. For more information on the **IESNA Illuminance Selection Tool**, reference section 10.3 – The IESNA Illuminance Selection Tool.
2. Enter any Design Constraints that apply. The **Lumen Method Tool** will automatically compute the logical design that best meets the Design Parameter while obeying the Design Constraints.
3. Select the illuminance units to be used in the final design, if different than the footcandles default.
4. When satisfied with the design, either select NEXT to go on to Step 5 and specify a point by point calculation, or FINISH to export the design to the Visual **Design Environment**.

2.1.6 Step 5 – Calculation Grid
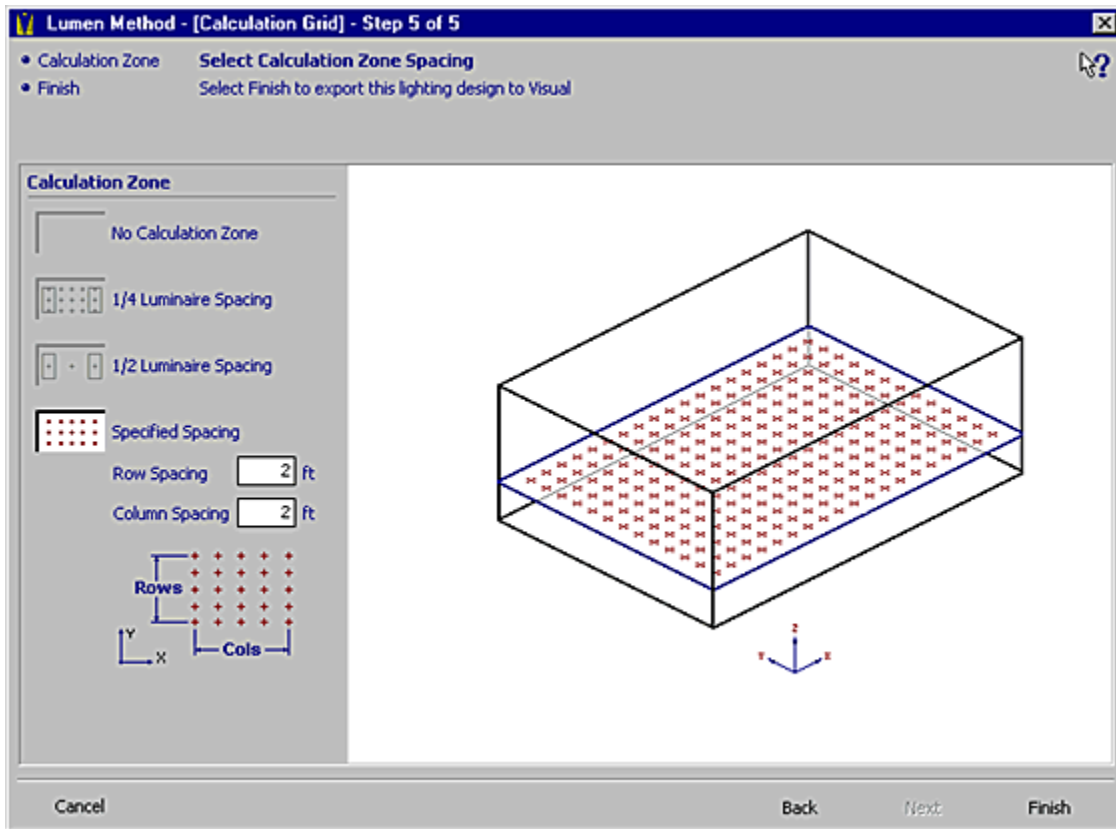
1. Select the Calculation Zone spacing from the four options. If SPECIFY is selected, specify the row and column spacing between the calculation points in the text boxes.
2. Select FINISH to export the design to the Visual **Design Environment** and initiate the point by point illuminance calculations.

2.2 The Light Loss Factor Calculator
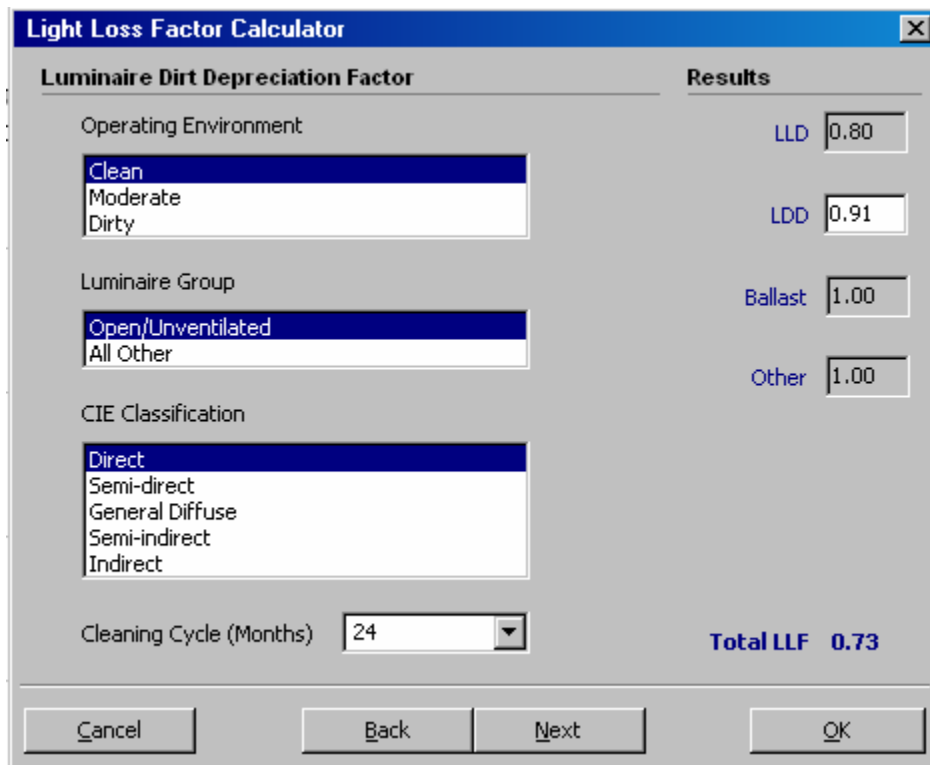
Within the **Lumen Method Tool**, you may specify the light loss factor by using the **Light Loss Factor Calculator**. The calculator will yield a light loss factor based on lamp type, air quality, cleaning cycles and other pertinent variables. The default value for each factor that contributes to the light loss factor is 1.00. If a factor value is unknown it is best to leave the default value for the factor.

Step 1 – Lamp Lumen Depreciation Factor

1. Select the lamp type (Incandescent, fluorescent or HID) from one of the three option buttons.
2. Select the specific lamp being used from the list box. A lamp lumen depreciation factor will be entered in the LLD text box under the Results Header.
3. Select NEXT to go on to Step 2.

Step 2 – Luminaire Dirt Depreciation Factor

1. Select an operating environment (moderate or dirty).
2. Select a luminaire group (ope/unventilated or all other).
3. Select a CIE classification (semi-direct, general diffuse, semi-indirect, indirect).
4. Luminaire dirt depreciation factor will be entered into the LDD text box below the Results Header.
5. Select NEXT to go on to Step 3.

Step 3 – Ballast Factor

1. Select the ballast type from the Ballast Type list box. A ballast factor will be entered into the Ballast text box under the Results Header.
2. Select NEXT to go on to Step 4.

Step 4 – Miscellaneous Factors

1. Enter the values for any of the factors listed under the Other Factors Header. The multiplication of these factors will be entered in the Other text box under the Results Header. The total LLF is listed at the bottom of the calculator.
2. Select FINISH to close the **Light Loss Factor Calculator**. The calculated LLF will be entered in the LLF text box in the **Lumen Method Tool**.

2.3 The IESNA Illuminance Selection Tool
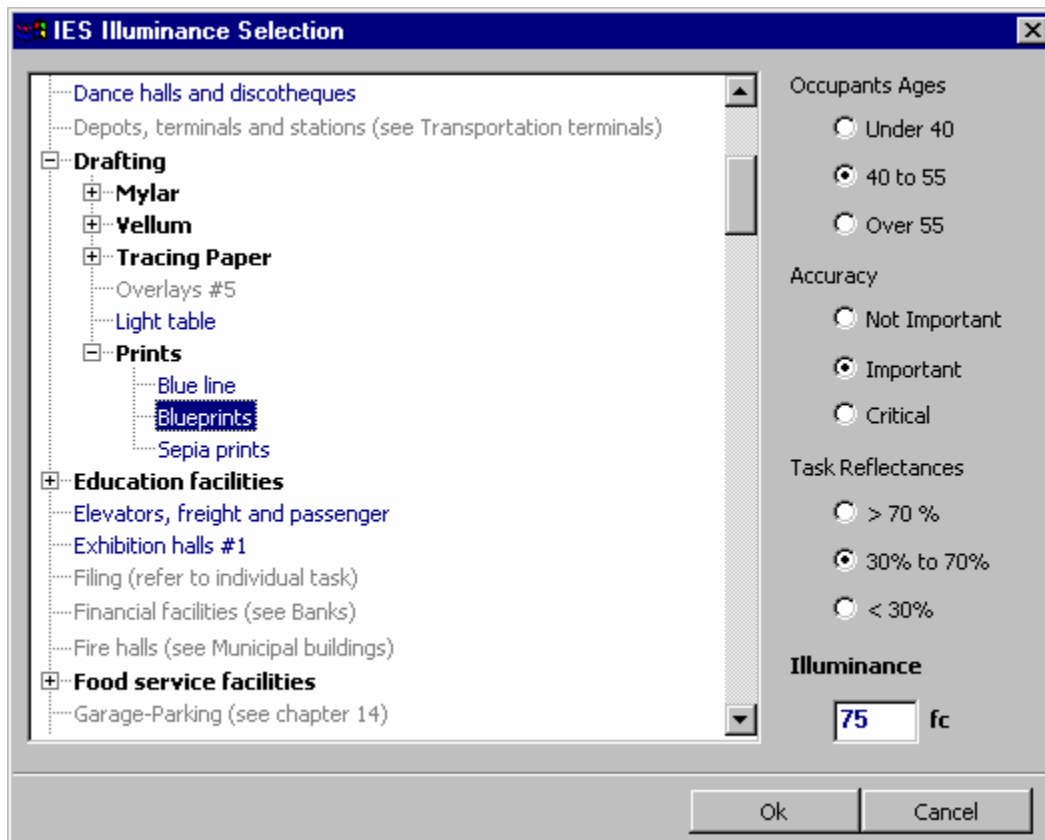
The **IESNA Illuminance Selection Tool** is a quick method to find the recommended illuminance level for a given task. The illuminance levels in this tool are based on the Illuminating Engineering Society of North America's recommended illuminance levels.

1. Select the task from the treeview on the left. The initial recommended illuminance level will be displayed in the Illuminance text box.
2. Select the appropriate option buttons under the Occupants Ages, Accuracy and Task Reflectances Headers. The adjusted recommended illuminance level will be displayed in the Illuminance text box.
3. Press Oᴋ. The recommended illuminance level will be placed in the Illuminance text box under the Design Parameters Heading in the **Lumen Method Tool**.

2.4 Selecting a Photometric File

It will often be necessary to select a photometric file for use with a Luminaire. This is accomplished via the **Photometric File Dialog**. Much of the operation of the **Photometric File Dialog** is similar to standard Windows file dialogs. Additional functionality specific to photometric data has been added to aid in finding a specific luminaire.

2.4.1 The Files Tab
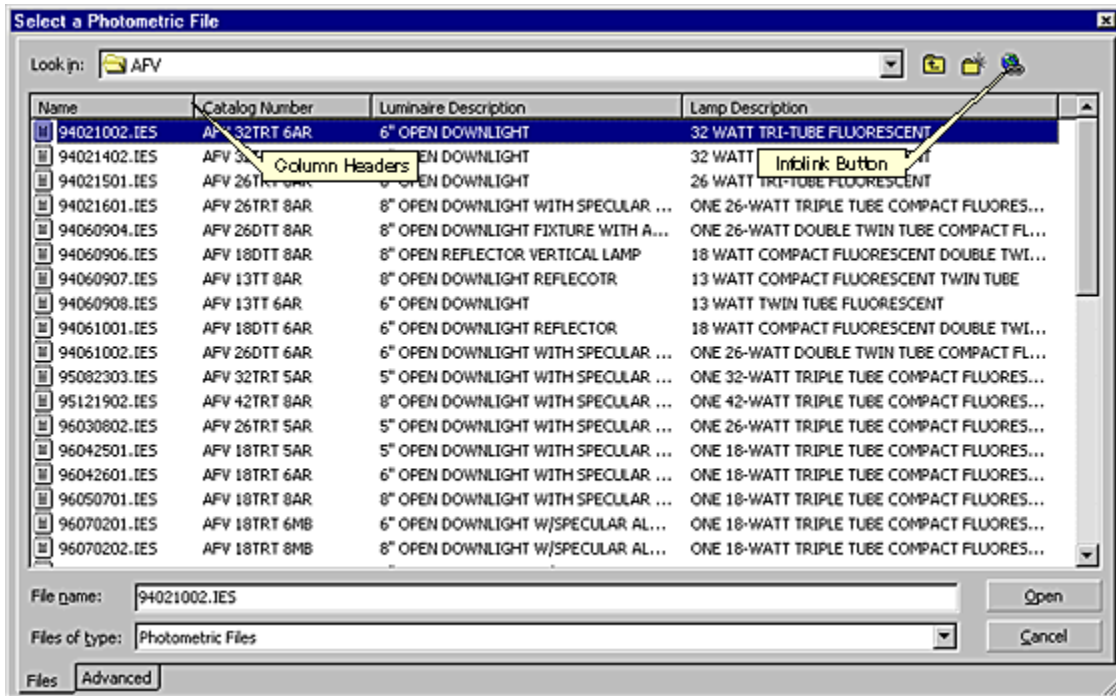
The dialog will by default list any files with an IES, LDT, CIB, TMS, or CB1 extension. Files with other extensions may be seen by either selecting "All Files" from the FILES OF TYPE: list; or by typing ***.???** (where **.???** is the desired extension) into the FILE NAME: field and pressing ENTER. Visual can read any photometric file that is formatted in accordance with the IESNA LM-63, EULUMDAT, or CIBSE-TM14 specifications.

Each file in the selected directory that matches the desired file type is opened and its header is read. The header data is displayed underneath the corresponding Column Header. The file list may be sorted by clicking on any of the Column Headers. Clicking on the same Column Header reverses the order of the sorted list. Some photometric files may not contain certain header information, in which case the corresponding Column entry will be blank. This does not imply that the photometric file is invalid, only that there is no header data to display.

Some photometric files may contain an infolink, which points to a web page containing information particular to that file. If a file containing an infolink is selected from the file list, the Infolink button will be activated. Clicking this button will launch the default web browser and direct it to the appropriate web page.

2.4.2 The Advanced Tab

Column Headers may be turned on or off, repositioned, or customized by clicking on the Advanced tab in the bottom-left corner of the dialog. A list of Column Headers and their associated header data will be displayed.
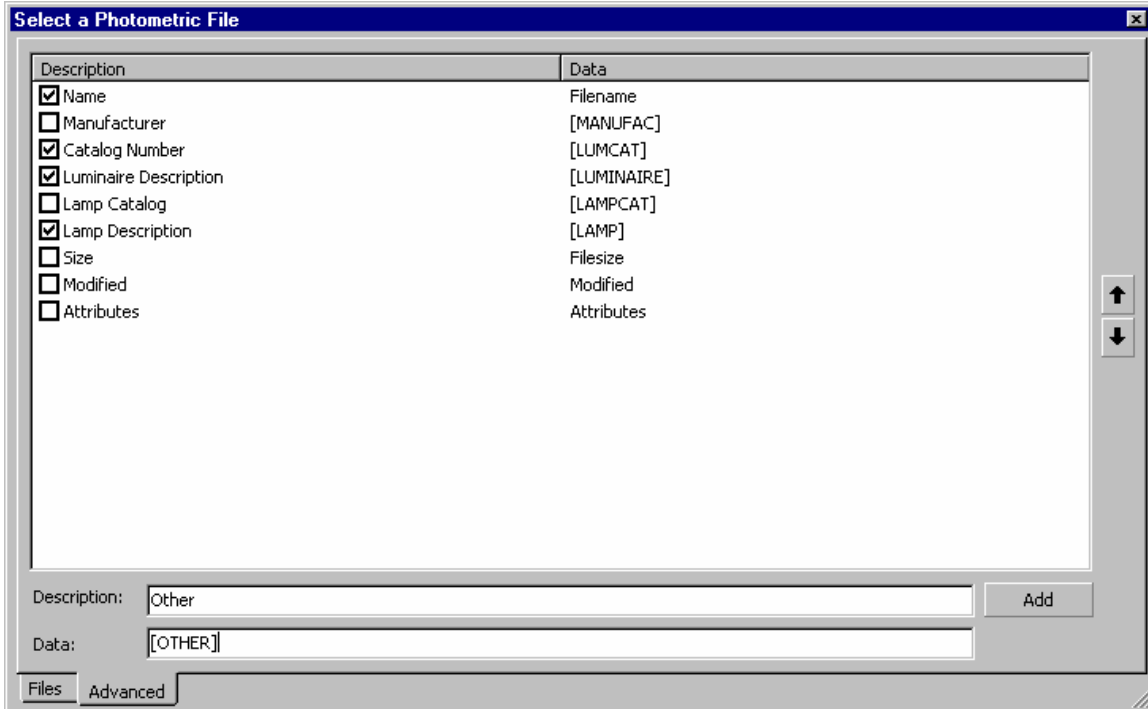
To turn a column on or off, check or uncheck the box next to the desired Column Header name.

To reposition a column, click on the Column Header name to select it. Then use the arrow buttons on the right of the dialog to move the column through the list. The Name column header that corresponds to the filename can not be turned off or repositioned (it will always be the first column).

To add a custom column, enter the name of the Column Header in the Description: field. Then enter the header data to search for into the Data: field. It is important that this matches exactly with the header field in the photometric file. Finally, click the Add button. A new entry will be added to the column list.

To delete a custom column, click the desired Column Header name to select it, then press the DELETE key. Only column headers that have been added using the Add button may be deleted.

Chapter 3
Getting Around the Design Environment

Where possible, the developers of Visual have attempted to incorporate standard practices in the design of the user interface. Those having experience with other Windows and Computer Aided Design (CAD) applications should find the **Design Environment** interface familiar in terms of both form and function. This chapter discusses some of the basic elements of program operation.

3.1 Using the Mouse

In Visual, the following mouse operations are recognized:

- Left Click - Click the left mouse button once.
- Right Click - Click the right mouse button once.
- Double Click - Click the left mouse button twice rapidly.

Use Left Click to:

- Select a menu item, toolbar button, or other graphical control.
- Select a coordinate location.
- Select an object.
- Begin a selection fence or window.
- End a selection fence or window.

Use Right Click to:

- End the current command.
- Re-issue the previous command when inside the Design Window.

Use Double Click to:

- Select and open/import a file.
- Select all text in a field for editing.

As the mouse traverses the screen, the pointer changes from crosshairs while inside the Design Window, to an arrow when outside. Upon selecting a text field (Left Click), the pointer becomes an I-beam. This indicates that text information can be entered or edited. Occasionally, the mouse pointer will become an hourglass. This indicates that the system is currently busy and that data entry is momentarily suspended.

3.2 Keyboard Commands

Visual incorporates a small number of keyboard commands, also known as hot keys, to simplify the 3-D navigation and object selection processes as follows:

ESC   Cancels the current command. Unselects all objects if not in a command.

A   Zoom All

C   Copy

E   Erase

M   Move

P   Zoom Previous

R   Redraw

U   Undo

W   Zoom Window

Selection Hot Keys – The following keyboard commands are only available when selecting objects.

A   For Add, changes the selection mode toggle to add when selecting objects.

C   For Crossing, toggles a selection rectangle between a window and a fence.

P   For Previous, automatically selects all the objects that were selected for the previous command.

R   For Remove, changes the selection mode toggle to remove when selecting objects.

L   Selects All objects.
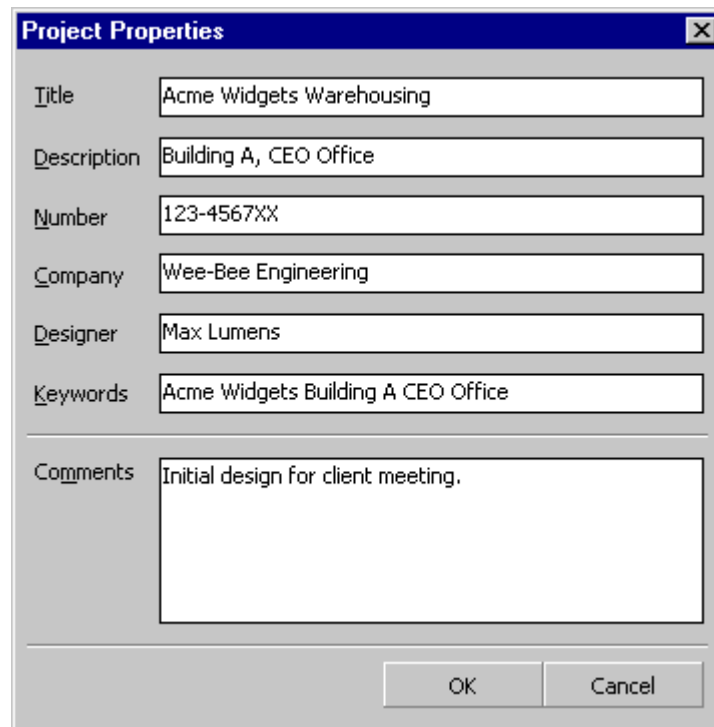
3.3 Opening or Starting a New Project

Upon entering the application, the **Lumen Method Tool** will be displayed. To begin a new
project file, proceed with the step by step process presented in the Tool. When the design is
completed it will be exported to the **Design Environment** where it may be saved as a Visual
Basic Edition file.

To open an already existing Visual Basic Edition file, select CANCEL on the **Lumen Method Tool**
to access the **Design Environment**. Select OPEN from the FILE MENU or associated Toolbar
button. The **Open File Dialog** will appear. Select the desired Basic Edition file and press the
OPEN button. The file will be opened in the **Design Environment**. The same result can be
achieved by selecting one of the recent files from the bottom of the FILE MENU.   Note that the
Basic Edition can not open a Professional Edition file.

An important aspect of starting a new project is entering project information.   For administrative
reasons, Visual allows project information to be entered and saved with the electronic file.
Selecting PROJECT from the FILE MENU will launch the **Project Properties Form**.

All fields are optional and this information may be entered at any stage of the modeling process.
Project information is used to uniquely identify Visual lighting models and to expedite the
documentation process.

Later operating systems also provide access to this information through the Properties page of a
Visual file in the Windows file explorer (right-click on the file name, select Properties from the
pop-up menu and select the Summary tab). Windows explorer can be configured to display any
or all of this data when browsing for files.

NOTE: Some fields available through Windows explorer are not supported by Visual. Only the
seven fields shown above will be saved with a Visual file.

3.4 Saving a Project

Visual projects may be saved at any time. To save a project, simply choose SAVE or SAVE AS…
from the FILE MENU. The SAVE command will only prompt for a file name and directory the first
time that it is issued. Subsequently, the SAVE command will assume that the same file name and
directory are intended, thus overwriting the file automatically. The SAVE AS command always
prompts for a file name and directory. The SAVE AS command is useful when you want to save
the file without overwriting the previous version.

3.5 Undo and Redo

As with many MS Windows$_{TM}$ applications, Visual incorporates UNDO and REDO commands to
lesson the potential loss of information due to the inevitable "oops". The fifteen previously issued
Design Environment commands can be undone, one at a time and in reverse order, by
repeatedly choosing UNDO from the EDIT MENU or by pushing the UNDO button on the FILE
TOOLBAR. The REDO command tracks only the most recent single operation performed by the
UNDO command allowing that operation to be restored in the event that too many UNDO
operations were inadvertently performed. The REDO command resides adjacent to the UNDO
command in both the EDIT MENU and the FILE TOOLBAR.

3.6 Choosing a View

Visual provides an interactive interface for the construction and analysis of lighting models. As such, a number of tools and commands have been incorporated to make the process of view navigation as simple and intuitive as possible. All view commands are transparent, meaning that they can be initiated while in the midst of other commands if necessary.

3.6.1 Panning

Pan (short for Panorama) is a term brought to computer graphics from the video realm. It refers to a linear translation of the graphic presented in the Design Window as a result of selecting two points on the screen. Think of it as selecting a point on the screen, followed by the new desired location for that point. PAN is used to shift the contents of the Design Window in order to reveal portions of the model space adjacent to the current view as depicted in the graphic below:
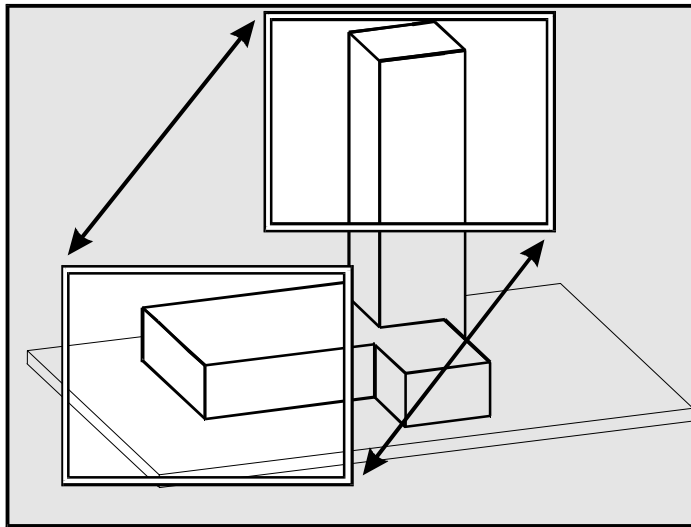
To PAN the view, simply choose PAN from either the VIEW MENU or the FILE TOOLBAR. Now, select a reference point in the graphic space of the Design Window followed by the new location for that point. Since PAN is literally translating the graphic image within the Design Window, point selection here should not be confused with coordinate selection (described later).

3.6.2 Zooming

Zoom is another term borrowed from the video realm to describe the degree of graphic enlargement. Zooming in and out has the same effect in Visual that it does with a camera lens. The field of view is enlarged and reduced as depicted in the graphic below:
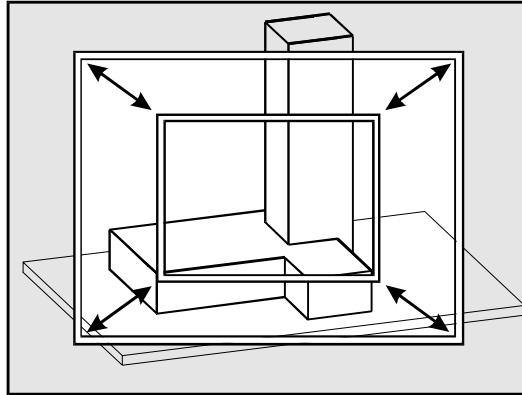
In Computer Aided Design (CAD) applications, the term "zoom" has been adapted to encompass a number of operations related to changing the view. For the sake of consistency, many of these commands have been adopted in Visual. Each has distinct advantages as outlined below:

ZOOM WINDOW fills the Design Window with the information contained within a selected rectangular region of the screen. Simply initiate this command by selecting ZOOM WINDOW from either the VIEW MENU or the VIEW TOOLBAR. The Status Bar will prompt for opposing corners of a rectangle defining the region of interest. Upon selecting one corner, the implied rectangle will be dynamically drawn as the mouse is moved inside the Design Window. Selecting the opposing corner will terminate the command and the new view will automatically be reflected in the Design Window.
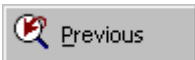
ZOOM PREVIOUS recalls the previous view to the design window. This command is initiated by selecting ZOOM PREVIOUS from either the VIEW MENU or the VIEW TOOLBAR.
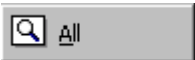
ZOOM ALL automatically determines the view that, from the same view direction, contains all objects currently within the **Design Environment**. Initiate this command by selecting ZOOM ALL from either the VIEW MENU or the VIEW TOOLBAR.

As the name suggests, ZOOM IN automatically enlarges the view about its center by a factor of 1.5. Initiate this command by selecting ZOOM IN from the VIEW MENU or the VIEW TOOLBAR.

ZOOM OUT is the opposite of ZOOM IN; it automatically reduces the view about its center by a factor of 1.5. Initiate this command by selecting ZOOM OUT from the VIEW MENU or the VIEW TOOLBAR.

3.7 Selecting Objects

Many Visual commands require that objects within the lighting model be selected either for modification or reference. Generally speaking, these commands may be applied to objects either individually, or in groups. The process typically consists of object selection followed by the specification of any information necessary to complete the particular command. Because the object selection process is a common occurrence, Visual incorporates a consistent routine for the sake of simplicity.

Upon initiating any command involving object selection, the Status Bar will prompt for the selection of objects. The mouse crosshairs will temporarily change to a pick-box indicating that Visual is in the object selection mode. Luminaires require selection at the center of the Luminaire Symbol. All objects having an element within the pick-box will turn the selection color to indicate that they have been added to the selection set.

Frequently, it is convenient to select a number of objects at once. For this, Visual incorporates a "window and fence" technique. Should a Left-Click be issued when there are no objects within the pick-box, Visual will automatically assume that selection by window and fence is desired. A rectangle will be dynamically drawn starting at the location of the first Left-Click as the mouse is moved within the Design Window. Moving to the right creates a window, while moving to the left creates a fence - indicated by solid and dashed lines respectively. The opposite corner of the rectangle is then chosen with a Left-Click to define the rectangular selection region. When a window is present, any object that resides entirely within the window will be selected. When a fence is present, objects having any portion within the fence will be selected. Here again, Luminaires are taken to be a single point at the center of the Luminaire Symbol.

The selection process also allows objects to be removed from the selection set. To toggle to the "Remove" selection mode, press the R key on the keyboard while the pick-box is active. The Status Bar will indicate that the subsequently selected items will be removed from the current selection set.

Press the A key to return to the "Add" selection mode. The various methods of the selection process (Pick, Window, Fence, Add, and Remove) are used repeatedly until the selection set contains only the desired objects. The process is then terminated with a Right-Click of the mouse.

Chapter 4
Model Modification

The Visual Basic Edition provides a few commands that can be used to modify the position of the Luminaires after the model has been exported from the **Lumen Method Tool**. Luminaires may be copied, moved or erased. Use of these commands requires some knowledge of 3D modeling concepts. This chapter will introduce the requisite concepts then describe the modification commands.

4.1 Basic Modeling Concepts

4.1.1 Coordinate Systems

Visual uses the familiar Cartesian coordinate system (X,Y,Z) as its primary means of communicating location in two and three dimensions. The X and Y-axes generally correspond to dimensions of length and width while the Z-axis corresponds to that of height as indicated in the diagram below.
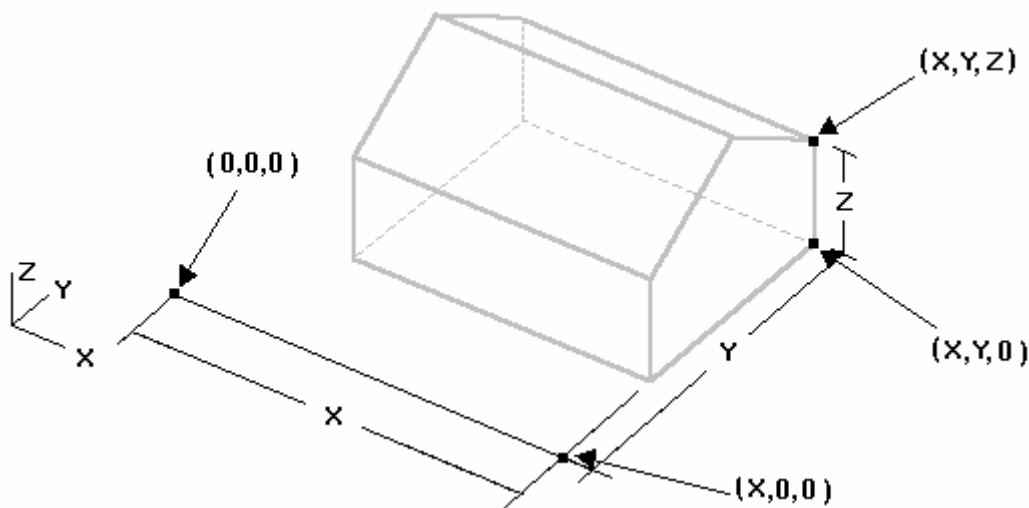
4.1.2 Incremental Snap

Incremental Snap is a feature incorporated in most graphical software systems to allow precision operation of the pointing device (mouse, etc...). It simply means that the graphics pointer is only permitted to occupy distinct locations and that mouse movements causes the mouse pointer to "snap" to the next valid location rather than glide continuously. A snap increment of five feet, for instance, would only allow the mouse pointer to move in increments of five feet (5,10,15,20, etc...) Snap increment is important because it allows rapid selection of exact locations and helps to keep lines truly parallel and perpendicular. Learning to set the snap increment to an appropriate value while entering information in Visual will affect both the speed and quality of data entry. Too large an increment disallows detailed data entry while too small an increment can result in tedium. It is common to change the snap increment periodically during the course of constructing a lighting model.

It is best to choose a snap increment that represents the finest level of detail required for a given task. An increment of two feet would be appropriate for entering a 2 X 4 ceiling grid, for instance. For more information on setting the Incremental Snap, reference Chapter 7 - Using the Options Form.

A further restrictive element of Incremental Snap is Orthogonal Mode. In Orthogonal Mode, the mouse pointer moves only in the cardinal directions (X,Y,Z). Orthogonal mode is useful when constructing models whose elements lie only in the cardinal planes (no skew or angled surfaces). In Orthogonal Mode, most standard architectural geometry can be entered very quickly. For more information on toggling the Orthogonal Mode, reference Chapter 7 - Using the Options Form.

4.1.3 Entering Coordinates

Coordinate information is fundamental to Visual. Coordinate information can be entered via mouse pointer navigation and Command Line text entry. The following is a detailed explanation of each of these important methods.

Mouse Pointer Navigation

Coordinates are most often selected by moving the mouse pointer within the Design Window while referencing the absolute and relative coordinates being reported on the Status Bar. Assuming an appropriate snap increment has been set, the mouse pointer can be made to rest on the exact location desired. When working with a relatively fine snap increment, it is often helpful to zoom in to the area of interest thereby affording a greater degree of mouse pointer control.

Command Line Text Entry

The other means of entering coordinates in Visual is via the Command Line. Whenever exact coordinates or distances are known, keyboard entry can be most convenient. The Command Line turns to a text box and can receive keystrokes anytime Visual is expecting a coordinate location to be entered. Coordinates are entered in the format X Y Z separated by a single space or a comma and followed by the ENTER key. In the example below, the coordinates X=10, Y=20, and Z=5 were entered.

```
Line - First Coordinate ( X Y Z ) : 10 20 5
```

An alternative way to enter coordinates is to indicate the relative coordinates to the previous location. This is often useful when entering information from a dimensioned drawing or sketch. The ampersand symbol, @, is entered first to indicate relative coordinate entry. This is either followed by the relative X Y Z coordinates or a distance followed by the < symbol and a direction angle. Here, spaces are optional since the values are already delineated and once again, the command is completed with the ENTER key. Direction angles are measured positive in a counter-clockwise manner starting from the positive X-axis. In the example below, a coordinate 30 units (feet/meters) from the previous point is entered at an angle of 45 degrees to the positive X-axis, the Z value remains constant.

```
Line - Next Coordinate ( X Y Z ) : @30<45
```

Note that it is not necessary to learn and use both methods of coordinate entry in Visual. Any coordinate location can be selected by either of the above methods. The two techniques are provided strictly as alternatives to make the coordinate selection process as easy as possible.

Seasoned users will likely utilize both methods since each has distinct advantages depending on the task at hand.

4.2 Copying Luminaires

The COPY command is used to produce single or multiple copies of all selected Luminaires. After Luminaire selection, the Command Line will prompt for the additional specification of base and destination points. The base point is a reference point, or handle chosen for its position relative to the currently selected objects and the destination point represents the desired new location of that point within the design space. Both coordinates may be entered either graphically or via text entry at the Command Line. Upon selection of a base point, movement of the crosshairs within the Design Window will produce an implied graphical representation of the selected Luminaires as they are being translated to aid in the proper selection of a destination point. Copies may be repeatedly placed until the command is terminated with a Right Mouse Click.

4.3 Erasing Luminaires

The ERASE command is used to eliminate selected Luminaires from the lighting model. Since no additional information is required, terminating the selection process also completes the command.

4.4 Moving Luminaires

The MOVE command is used to uniformly translate selected Luminaires in any dimension within the model space. After object selection, the Command Line will prompt for the additional specification of base and destination points. The base point is a reference point, or handle chosen for its position relative to the currently selected objects and the destination point represents the desired new location of that point within the model space. Both coordinates may be entered either graphically or via text entry at the Command Line. Upon selection of a base point, movement of the mouse crosshairs within the Design Window will produce an implied graphical representation of the selected Luminaires as they are being translated to aid in the proper selection of a destination point.

Chapter 5
Calculations and Results

Visual's primary function is to calculate *illuminance* levels at distinct locations in the lighting model for the purpose of lighting system performance verification. This chapter provides a brief overview of the calculations and the techniques for interpreting the results.

5.1 Illuminance

Illuminance is the most common metric used by the lighting industry for system performance verification. Loosely defined, illuminance is the amount of light falling onto an area. Thus illuminance is a density and is measured in either *footcandles* or *lux*. The footcandle is the English unit for illuminance and represents the number of *lumens* (light) incident on an area per square foot of that area. Lux is the metric equivalent of the footcandle and represents the number of lumens incident on an area per square meter of that area. The units used to display illuminance values in Visual may be changed in the **Options Form**.

### 5.1.1 The Directional Aspect of Illuminance

Illuminance is a directional quantity, meaning that one must speak not only of the illuminance level at a location in the model, but of the illuminance level in a particular direction at a location in the model. One can think of each calculation point as a miniature *illuminance meter*. The value that each illuminance meter reports depends on the orientation of the meter. For example, a meter at a particular location will have a greater illuminance reading when facing a Luminaire than if it faces away from the Luminaire.

Figure A: An illuminance meter facing a light source

Figure B: An illuminance meter facing away from a light source

Illuminance Meters

50 fc

3 fc

The Visual Basic Edition calculates *horizontal illuminance*. This is analogous to placing a light meter on one of these surfaces, facing the meter straight up, and taking a reading.

5.1.2 The Components of Illuminance

The illuminance value at any calculation point in a lighting model has two components. The first component is called the *direct component* and consists of illuminance produced at the calculation point by light that reaches the point directly from a Luminaire without being reflected off any of the Solid Surfaces in the model. The second component is the *interreflected component* and consists of illuminance produced at the point by light that, once emitted from a Luminaire, reflects off of one or more Solid Surfaces in the model before reaching the calculation point.
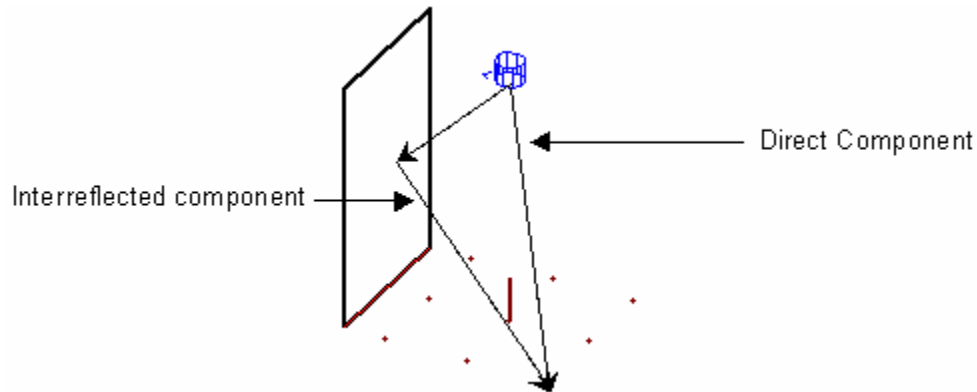
The Visual Basic Edition calculates the illuminance at the calculation points due to both the direct and indirect components.

5.2 The Automatic Calculation Feature

When making minor adjustments and/or revisions to a lighting model it is often useful to see the updated illuminance values after each modification. Visual Basic Edition has an AUTOMATIC CALCULATION feature that recalculates the model after any change that could effect the illuminance values. This feature is always active in the Basic Edition.

5.3 Statistics

While viewing the individual illuminance values that are displayed on the screen can be quite informative, it is often more useful to examine compiled statistics for the Calculation Zone. Visual reports the following statistics:

- Maximum Value
- Minimum Value
- Average Value
- Maximum to Minimum Ratio **or** Minimum to Maximum Ratio
- Average to Minimum Ratio **or** Minimum to Average Ratio
- Coefficient of Variance (Used primarily in sports lighting)
- Uniformity Gradient (Used primarily in sports lighting)

To expand or collapse the statistics for the Calculation Zone, Double Click on the bold title of the Calculation Zone in the Statistics Panel. The statistics that will be displayed in the Statistics Panel can be modified in the **Options Form**. By default, Visual will display all the statistics listed above except Coefficient of Variance and Uniformity Gradient.
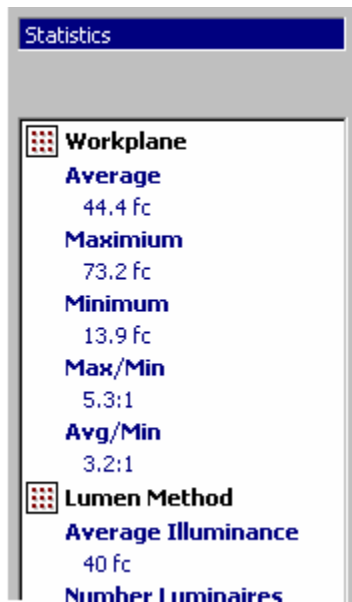
5.4 Setting and Displaying Iso-Illuminance Contours

Iso-Illuminance Contours are contour lines that are drawn on top of Calculation Zones to represent constant illuminance values in the same manner that the contours on a topographical map represent constant elevation. The values and colors of the Iso-Illuminance Contours that are displayed can be set in the **Options Form**. Up to ten different Iso-Illuminance Contours may be specified. The Illuminance value that each contour line represents is labeled at even increments along the length of the contour. The labeling increment may also be set in the **Options Form**.
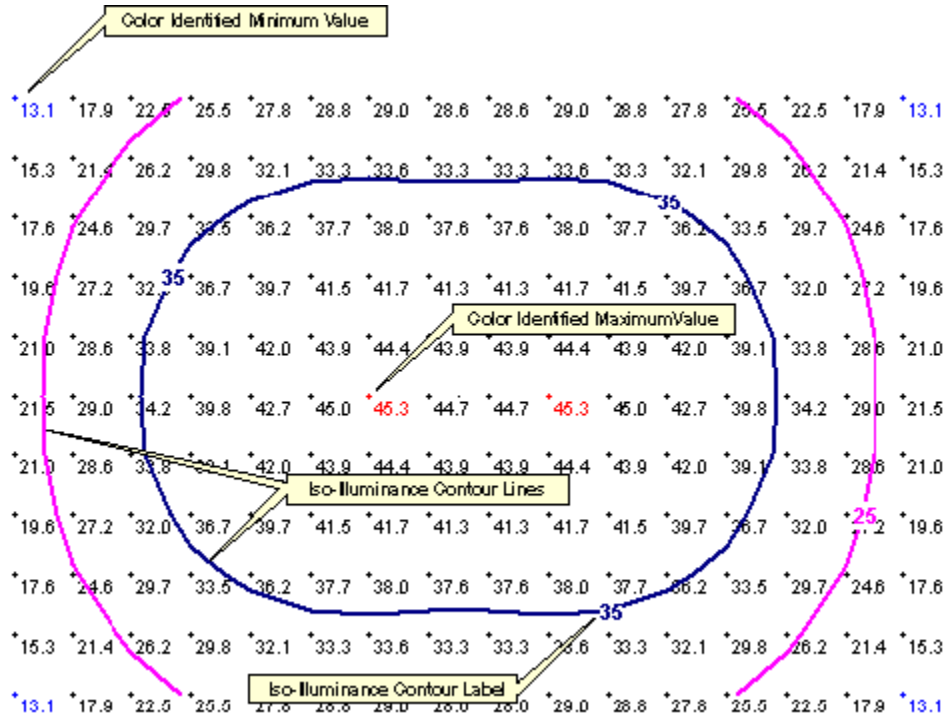
5.5 Color-Coding Illuminance Values

Visual provides several options for color-coding illuminance values. The first option is the Calculation Zone default color. This may be set on an individual basis from the **Dynamic Properties Bar** or in the **Properties Form**, or in the **Options Form** for all future Calculation Zones. All Calculation points and values will be displayed using the default color unless a maximum or minimum color applies as described below.

To help interpret the meaning of an array of point illuminance values, it is helpful to know the minimum and maximum values and where they occur. It can also be very useful to know the location and value of all illuminance points that are less than or greater than some threshold values. This is particularly helpful when trying to determine if all points in a given region have met a required code or specification.

By default, Visual applies the Calculation Zone maximum color to the maximum calculated value(s) in the Calculation Zone. Alternatively, the maximum color can be applied to all points and values that are above or equal to a user-specified threshold value. Finally, the maximum color

can be turned off if desired. These settings can be made on an individual basis using the **Options Form**.

The Calculation Zone minimum color behaves in the same way as the maximum color, with either the minimum calculated value(s) or any calculation point that is below or equal to a user-specified minimum threshold value being highlighted.
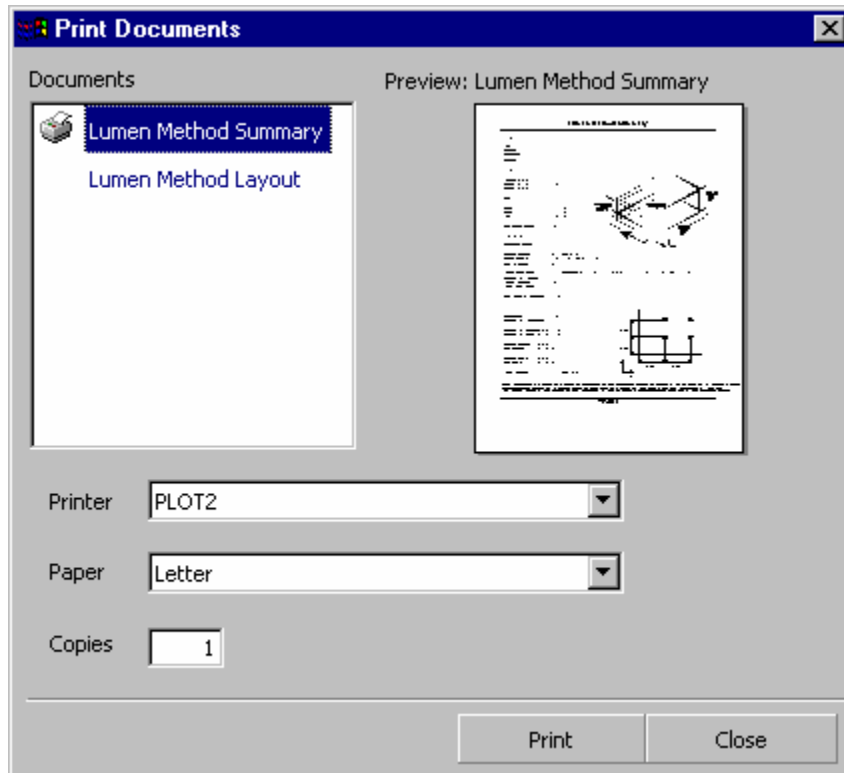
Chapter 6
Printing
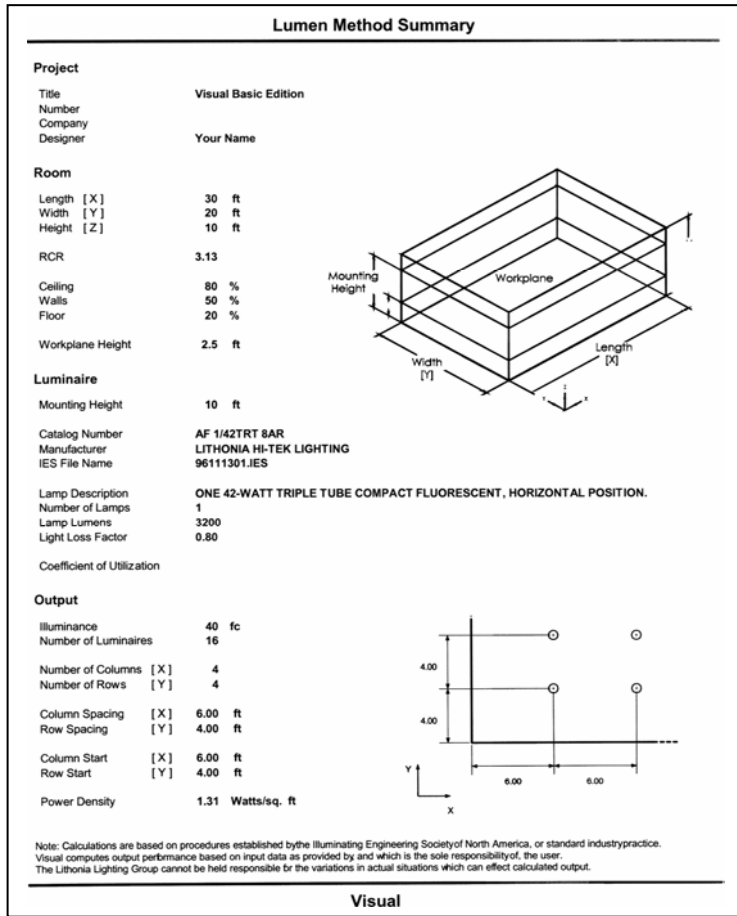
6.1 The Basic Edition Output

The Visual Basic Edition produces two documents that may be printed or plotted at any time after
the design has been exported from the **Lumen Method Tool** to the **Design Environment**. All
information pertinent to the design is included on the output.

6.1.1 The Print Selection Form

The PRINT command, accessed from either the FILE MENU or the associated toolbar button,
launches the **Print Selection Form**.   The Documents Box lists all the pages created by the
Basic Edition. Initially, only the Lumen Method Summary is marked to be printed (indicated by
the printer icon to the left of the page.) Select all the pages to be printed in the Documents Box.
The Preview Box on the right displays the page selected in the Documents Box. The Page
Properties Boxes below show which printer the page is being sent to and the specified paper
size. If desired, a different printer and paper size may be chosen for each page in the
Documents Box. Multiple copies of each page may be sent to the printer by changing the number
of copies for each page in the Copies Text Box. Pressing the PRINT Button will send the pages to
the directed printers. The CANCEL Button will close the **Print Selection Form**.

6.1.2 The Lumen Method Summary

Lumen Method Summary

Project

Title	**Visual Basic Edition**
Number	
Company	
Designer	**Your Name**

Room

Length [X]	30	ft
Width [Y]	20	ft
Height [Z]	10	ft
RCR	3.13	
Ceiling	80	%
Walls	50	%
Floor	20	%
Workplane Height	2.5	ft

Luminaire

Mounting Height	10	ft

Catalog Number	**AF 1/42TRT 8AR**
Manufacturer	**LITHONIA HI-TEK LIGHTING**
IES File Name	**96111301.IES**
Lamp Description	**ONE 42-WATT TRIPLE TUBE COMPACT FLUORESCENT, HORIZONTAL POSITION.**
Number of Lamps	1
Lamp Lumens	3200
Light Loss Factor	0.80

Coefficient of Utilization

Output

Illuminance	40	fc
Number of Luminaires	16	
Number of Columns [X]	4	
Number of Rows [Y]	4	
Column Spacing [X]	6.00	ft
Row Spacing [Y]	4.00	ft
Column Start [X]	6.00	ft
Row Start [Y]	4.00	ft
Power Density	1.31	Watts/sq. ft

Note: Calculations are based on procedures established by the Illuminating Engineering Society of North America, or standard industry practice.
Visual computes output performance based on input data as provided by and which is the sole responsibility of, the user.
The Lithonia Lighting Group cannot be held responsible for the variations in actual situations which can effect calculated output.

Visual

The Lumen Method Summary is a display of the design parameters and results. Easily faxable, it is a convenient way to convey simple design concepts, fixture specifications and fixture quantities.

6.1.3 The Lumen Method Layout

The Lumen Method Layout is an automatic arrangement of the graphical display of the model as seen in the **Design Environment**. A Title Block which contains all the project data entered in the **Project Properties Form** (see Chapter 3 - Getting Around the Design Environment) is included along with a Luminaire Schedule and a Statistics Chart.

Chapter 7
Using the Options Form

The **Options Form** is accessed through the TOOLS MENU. This is where parameters affecting the global operation of Visual reside. The **Options Form** provides a means for customizing the interface to meet specific needs and/or user preferences.

7.1 Selecting a Category

The global options contained in the **Options Form** are divided into six main categories. Category selection is made from the Category Selection Box on the left side of the form. Once a category is selected (by Left Clicking on the appropriate icon) the available options within that category are displayed on the right side of the form for editing. Options within each category are logically grouped and labeled for easy identification, and graphics are included where appropriate. Each of the option categories are described below. Once the desired options have been set, Left Clicking the OK button at the bottom of the form returns the user to the **Design Environment** with the new settings in place. Left Clicking the CANCEL button will close the **Options Form** without implementing any changed settings.
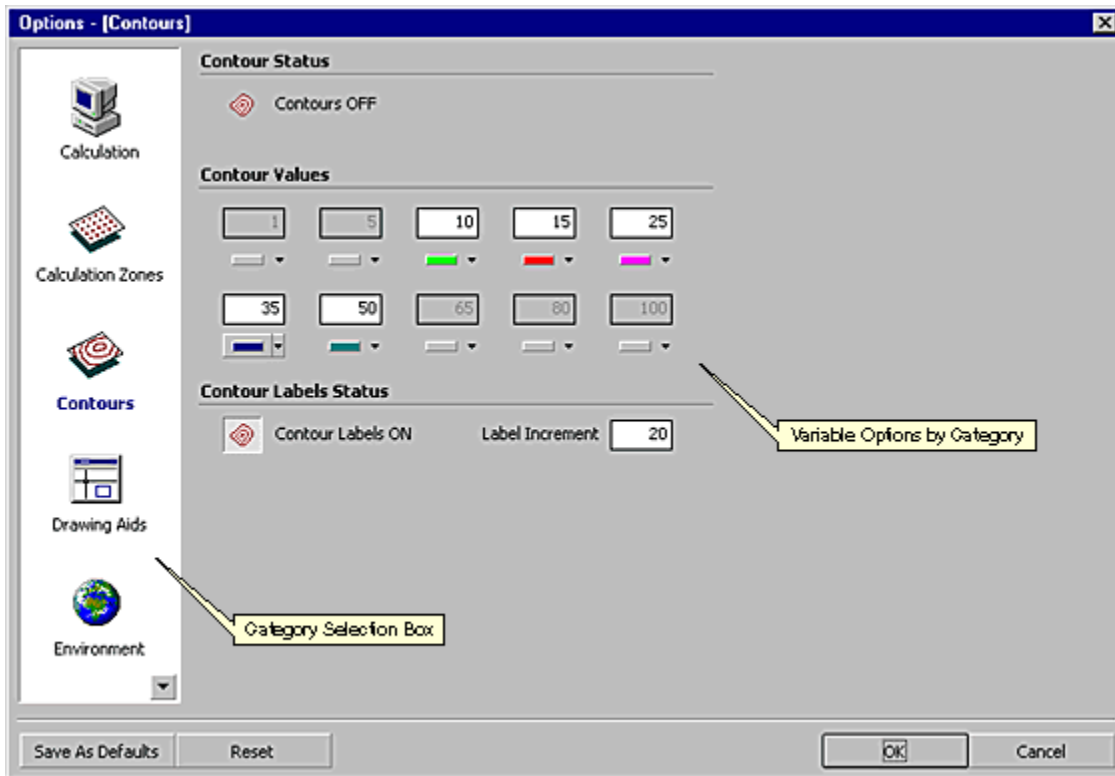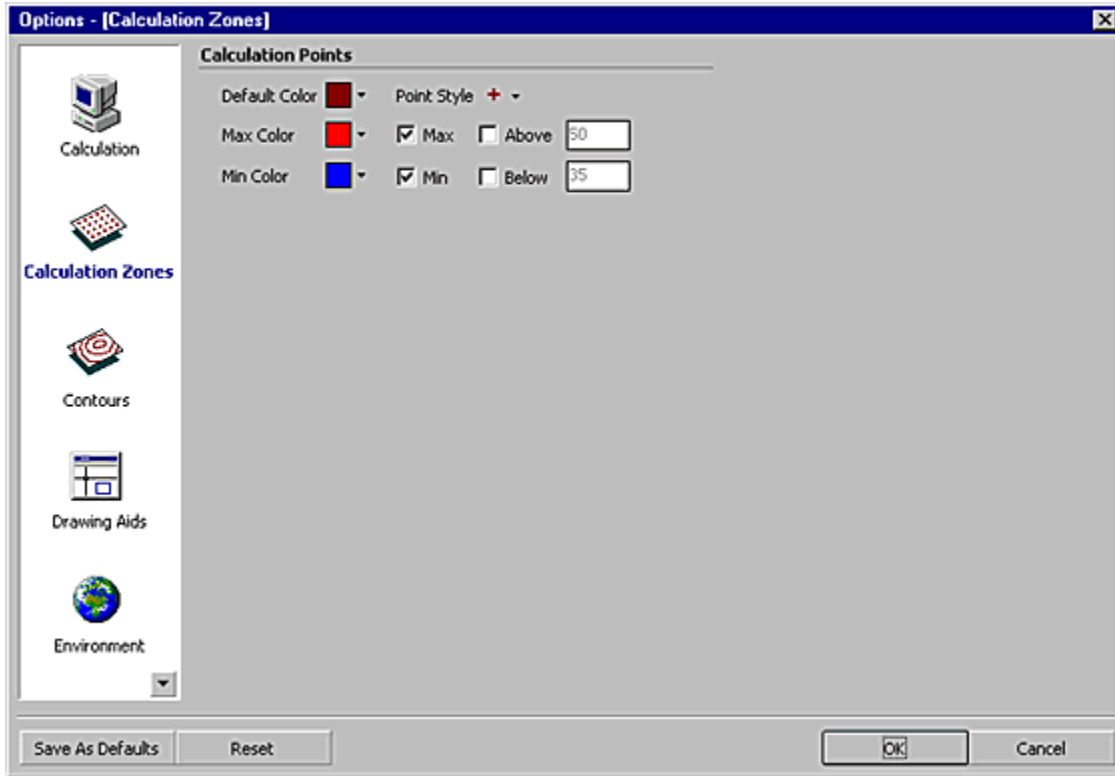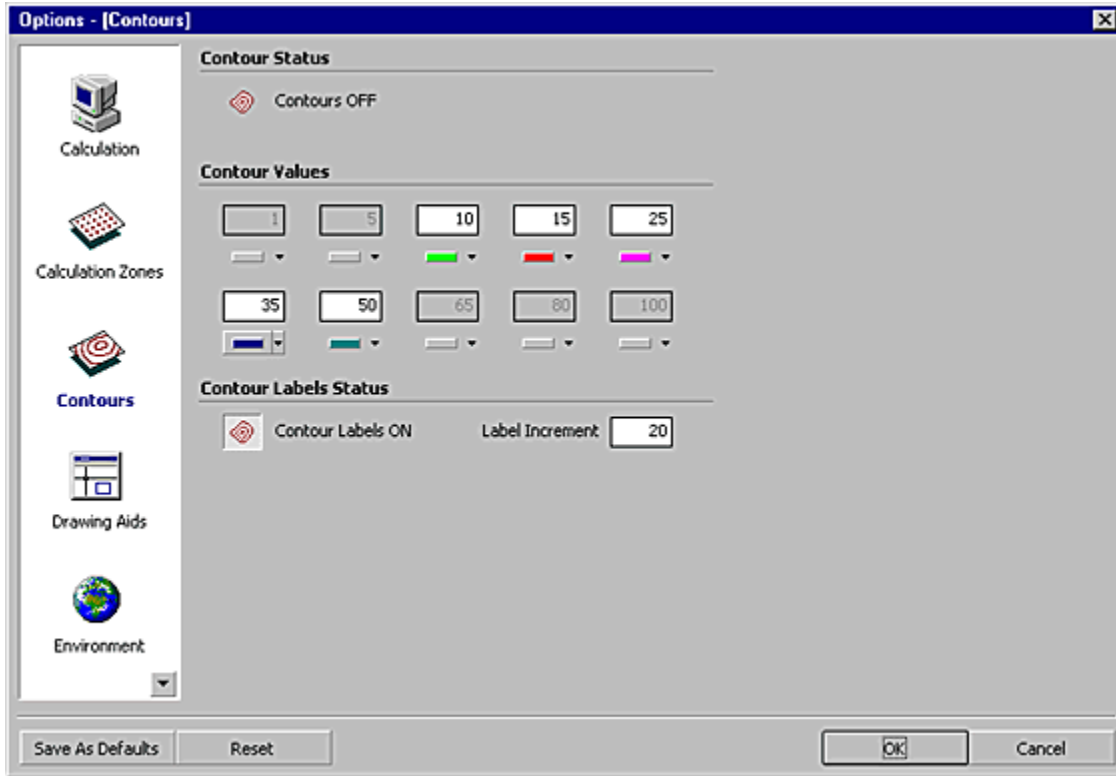
7.2 Calculation

If the Calculation category is selected, the **Options Form** appears as shown. Each of the options in this category is described below.
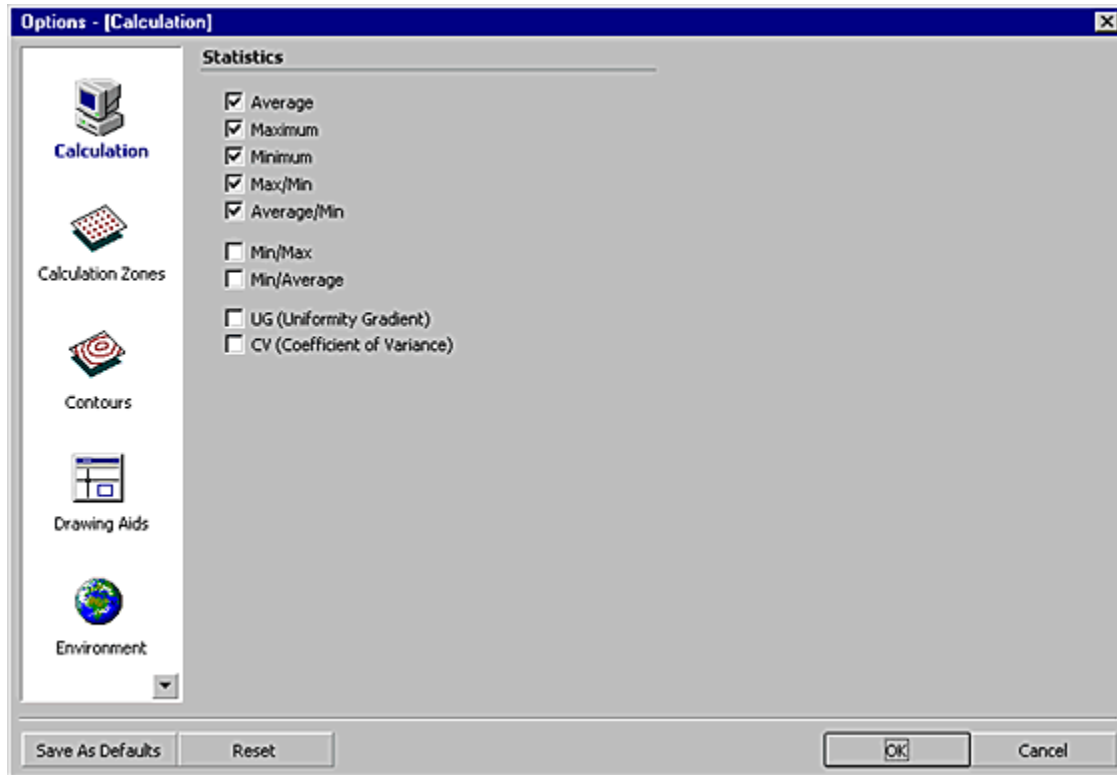
The Statistics option group controls which statistics are reported in the **Statistics Window**. All of the available statistical options are computed whenever the CALCULATE command is issued. The Statistics option group is only used to control which of the statistics calculations are displayed. For this reason, editing the Statistics option group does not require subsequent recalculation. See section 5.3 – Statistics for a detailed description of displaying and printing statistical information.

7.3 Calculation Zones

If the Calculation Zones category is selected, the **Options Form** appears as shown. Each of the options in this category is described below.


The Calculation Point Colors control the default color settings for all subsequent Calculation Zones. For a discussion of Calculation Zone color settings, refer to section 5.5 - Color-Coding Illuminance Values.

7.4 Contours

If the Contours category is selected, the **Options Form** appears as shown. Each of the options in this category is described below.

If the Contours Status Toggle is set to on, then iso-illuminance contour lines will be displayed. Each of these lines indicates all the positions on the Calculation Zone that have the same *illuminance* value. The illuminance value that each line represents is specified by the settings in the Contour Values option group. This option group also controls how many contour lines are displayed and what color they are drawn in. The Contour Values group has ten input blocks. Each block contains a text box with a list box below it. Each block is either on or off. If a block is on, then the text box will have a white background and a colored bar appears in the list box. If a block is not on, then both the text box and the list box bar are grayed. Each block can be toggled on and off by Left Clicking on the list box bar. For each option block that is on a contour line is drawn wherever a Calculation Zone has the same numerical value of illuminance as the number displayed in that block's text box. The contour line will be drawn in the same color as the colored bar shown in the list box. The illuminance value associated with a given contour line is set by editing the value in the text box. Likewise, the color of the line is set by choosing from the twelve colors available in the list box.

The Contour Labels button toggles the display of Contour Labels on and off. The value in the Label Increment field sets the number of linear units (feet or meters) between contour labels along a particular contour line.

7.5 Drawing Aids

If the Drawing Aids category is selected, the **Options Form** appears as shown. Each of the options in this category is described below.
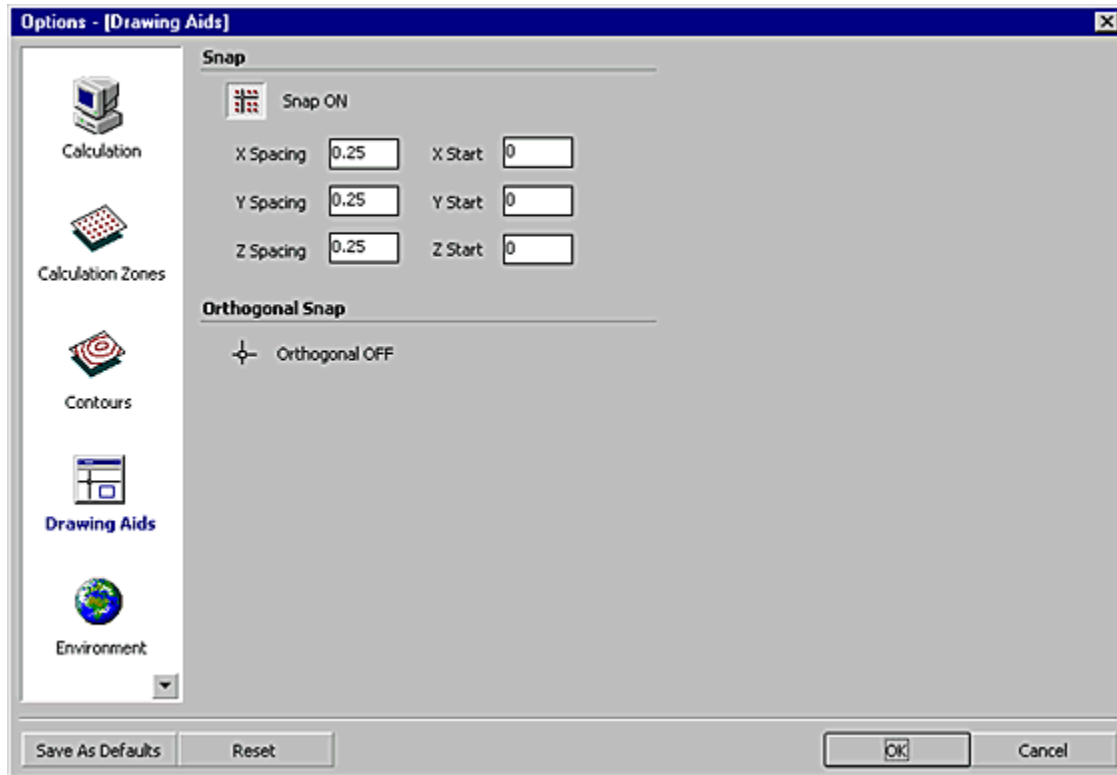

The Incremental Snap group controls the functioning of the Incremental Snap feature. This feature, described in section 4.1.2 - Incremental Snap, is toggled on and off by Left Clicking on the toggle button at the top left corner of the Incremental Snap option group. The current status of the Incremental Snap feature is shown to the right of the button. The six text boxes in the group specify the spacing and positioning of the Snap Grid. The left column of text boxes sets the spacing between adjacent snap points. A box for each of the cardinal axes allows the spacing between snap points to be set independently for the X, Y and Z dimensions. The right column of text boxes specifies the 3-D coordinates of a single snap point from which the rest of the snap points are spaced. This option controls the position of the snap grid with respect to the coordinates of the **Design Window**.

The Orthogonal option group controls the orthogonal drawing aide feature described in section 4.1.2 - Incremental Snap. The Orthogonal Mode is toggled on and off by Left Clicking on the toggle button in this group. The current status of the Orthogonal is shown to the right of the toggle button.

7.6 Environment

If the Environment category is selected, the **Options Form** appears as shown. Each of the options in this category is described below.
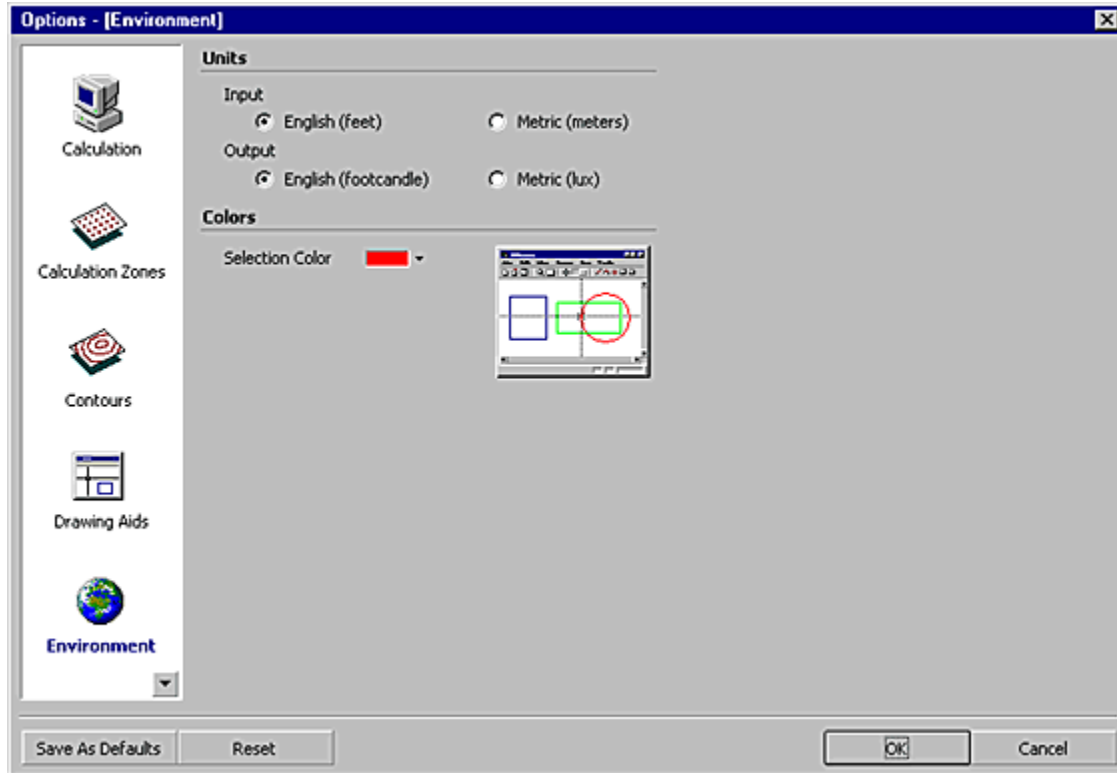

The Units option group configures Visual to use English or metric units of measure. The setting for Input Units corresponds to the coordinates and distances used to construct a model in the **Design Environment**. The English unit for these coordinates and distances is feet, and the metric unit is meters. It is important to note that changing the input units for a model that contains existing objects will not change the coordinate values of the objects, rather it will only change the units. Therefore, a 30 ft. by 20 ft. by 10 ft. room would become a 30m by 20m by 10m room. The Output Units setting corresponds to the *illuminance* values calculated by Visual. The English unit of illuminance is the *footcandle* (lumens per square foot) and the metric unit is *lux* (lumens per square meter).

In the **Design Window**, selected objects are highlighted with a color. To choose a new color, Left Click the down arrow at the right of the box and then select a color from the drop-down pallet.

7.7 Luminaires

If the Luminaires category is selected, the **Options Form** appears as shown. There are no options available for this category in the Basic Edition.
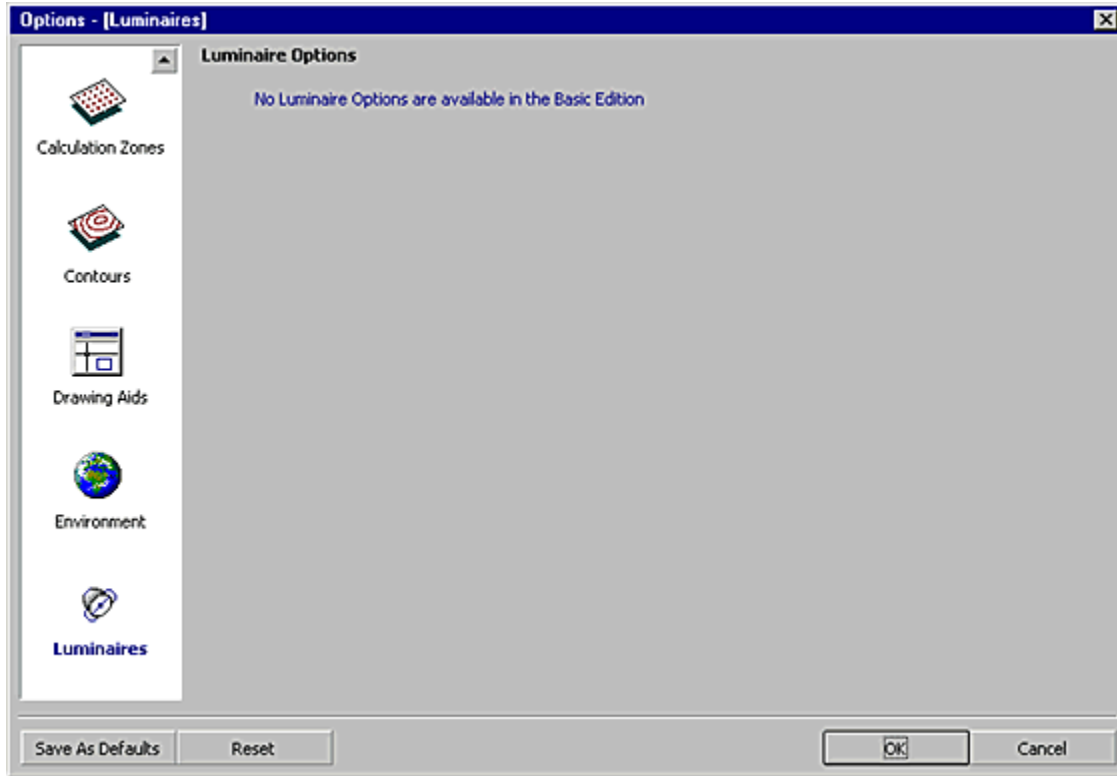
7.8 Saving and Resetting Default Values

Visual assigns defaults to all of the options in the **Options Form**. These defaults are the settings displayed for each option when the **Options Form** is accessed for the first time in a newly created file. By pre-assigning these settings, the user is able to begin a design without first having to take the time to set all the options. The default settings represent commonly chosen values for each option. If desired, the user can redefine the default settings of the **Options Form**. This is done by setting the options in each category to the desired value and then Left Clicking the SAVE AS DEFAULTS button at the bottom of the **Options Form**. The current settings will now be the default settings for any new file that is created.

The **Options Form** defaults described above apply to newly created files. If an existing file is opened, only some of these default settings are loaded into the **Options Form**. A number of the options retain the value that the file had when it was last saved. These "file specific" options are those options whose settings directly effect the appearance and calculations of the file. A list of the file specific options is given below by option category.

> **Environment**
> > Units
> **Calculation**
> > Statistics
> **Drawings Aids**
> > Incremental Snap
> > Orthogonal Mode
> **Calculation Zones**
> > Calculation Point Colors
> **Luminaires**
> **Contours**
> > All Contours category options

The **Options Form** can be reset to the original default settings by Left Clicking the RESET button at the bottom of the form. These settings can then be saved as the current set of defaults if desired. Both the SAVE AS DEFAULT and RESET buttons apply to the entire **Options Form**, not just the currently selected option category.
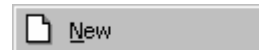
File Menu Commands

This section introduces the FILE MENU and corresponding Toolbar Commands. Detailed instructions are provided for each of the commands.

Contents

- NEW
- OPEN
- SAVE
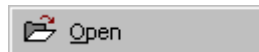- SAVE AS
- PRINT EDITOR
- PROJECT
- FILE HISTORY
- EXIT

New

To Start a New Visual File (*.VSL)

1. Select NEW from the FILE MENU.
2. The **Visual Splash Screen** will display followed by the **Lumen Method Tool**.
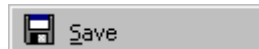3. Follow the instructions at the top of the Tool.

Open

To Open a Visual File (*.VSL)

1. Select OPEN from the FILE MENU.
2. The **File Selection Dialog** will display.
3. Select a Visual File to open.
4. Click OPEN.

Save

To Save a Visual File (*.VSL)

1. Select SAVE from the FILE MENU.
2. If the current Visual file has not been previously saved the **File Selection Dialog** will appear so that a directory and filename may be specified.
3. When the hourglass symbol disappears, the file has been saved.

Save As

Save As...

To Save a Visual File for the First Time, or Rename a Current File

1. Select SAVE AS from the FILE MENU.
2. The **File Selection Dialog** will display.
3. Select the directory to save the file in.
4. Type the desired filename in the Filename Text Box, or Choose an existing file.
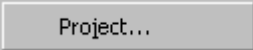5. Click OK.

Print

Print ...

To Open the Print Selection Form for Printing Output

1. Select PRINT from the FILE MENU. The **Print Selection Form** will open, displaying the interface for selecting printed output.
2. To return to the **Design Environment**, select CLOSE EDITOR from the Print Editor's FILE MENU.

Project

Project...

To Assign/Edit the Project Properties

1. Select PROJECT from the FILE MENU. The **Project Properties Form** will display.
2. Edit the Project Properties text boxes.
3. Click OK.

File History

File History

To Open a Recent File

1. The five most recent files will be displayed in this section of the FILE MENU. Click on the filename to open the file.

Exit

Exit

To Exit Visual

1. Select EXIT from the FILE MENU.
2. If the current file has not been saved Visual will prompt to save any new changes. Click OK to save changes.

Edit Menu Commands

This section introduces the EDIT MENU and corresponding Toolbar commands. Detailed instructions are provided for each of the commands.

Contents

- UNDO
- REDO

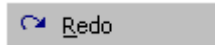## Undo ———————————————————————

Visual will undo up to 15 commands. The UNDO menu item will indicate the command you are about to undo. This command applies to all actions and all objects in the **Design Environment.**

To Undo the Last Command

1.   Select UNDO from the EDIT MENU.

Redo ———————————————————————

You may redo the last command that has been undone. This REDO menu item will indicate the command you are about to redo. This command applies to all actions and all objects in the **Design Environment.**

To Redo a Command that has been Undone

1.   Select REDO from the EDIT MENU.

View Menu Commands

This section introduces the VIEW MENU and corresponding Toolbar commands. Detailed instructions are provided for each of the commands.

Contents

- REDRAW
- ZOOM
- PAN

Redraw

To Redraw the Model

1. Select REDRAW from the VIEW MENU. The model will be redrawn in the current view.

Zoom

Any one of five zoom commands can be used to zoom in and out of the lighting model. Zooming does not change the viewing direction, but does change the scale at which you are viewing the model.

To Zoom In and Out of the Model

1. Select ZOOM from the VIEW MENU. The ZOOM SUBMENU will display to the side.
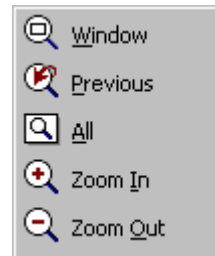
Zoom Window – zoom in on a portion of the model:

1. Select WINDOW from the ZOOM SUBMENU.
2. Draw a rectangle around the area you wish to enlarge. The Design Window will scale to display the area within the rectangle.

Zoom All – view entire model:

1. Select ALL from the ZOOM SUBMENU. The Design Window will scale to display the entire model.

Zoom Previous – display the previous zoom view:

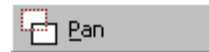1. Select PREVIOUS from the ZOOM SUBMENU. The previous view will display.

Zoom In – Zoom In a set amount:

1. Select ZOOM IN from the ZOOM SUBMENU. The Design Window will zoom in by a factor of 1.5.

Zoom Out – Zoom Out a set amount:

1. Select ZOOM OUT from the ZOOM SUBMENU. The Design Window will zoom out by a factor of 1.5.

Pan ————————————————————————————— 🗗 Pan

Short for the word panorama, PAN permits you to move the view of the model in a manner analogous to sliding the model behind the view window. PAN does not change the viewing direction, but rather "shifts" the view.

To Pan the Current View

1. Select PAN from the VIEW MENU.
2. Left Click to indicate the base point for the pan.
3. Drag the line at the angle and relative distance of the desired view shift.
4. Left Click to end the line. The view will pan in the direction of the line, relative to its base point.

Construct Commands

This section introduces the CONSTRUCT MENU and corresponding Toolbar commands. Detailed instructions are provided for each of the commands.

Contents

- COPY

Copy

To Copy Objects

1. Select COPY from the CONSTRUCT MENU.
2. Select the object(s) to copy.
3. Right Click when finished selecting the objects to copy.
4. Locate the base point for the Copy – Left Click within the Design Window OR key the coordinates into the Command Line.
5. Locate the destination point for the Copy – Left Click within the Design Window OR key the coordinates into the Command Line.
6. Right Click to terminate the command.

Modify Commands

This section introduces the MODIFY MENU and corresponding Toolbar commands. Detailed instructions are provided for each of the commands.

Contents

- ERASE
- MOVE

Erase ─────────────────────────────────────
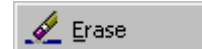
To Erase an Object

1. Select ERASE from the MODIFY MENU.
2. Select the object(s) to erase.
3. Right Click to finish selecting. The objects will be removed from the model.

Move ─────────────────────────────────────

To Move an Object

1. Select MOVE from the MODIFY MENU.
2. Select the object(s) to move.
3. Right Click to finish selecting.
4. Locate a base point for the Move – Left Click within the Design Window OR key the coordinates into the Command Line.
5. Locate the destination point for the Move – Left Click within the Design Window OR key the coordinates into the Command Line. The objects will be moved to the new location.

Tools Commands

This section introduces the TOOLS MENU and corresponding Toolbar commands. Detailed instructions are provided for each of the commands.

Contents

- LUMEN METHOD
- OPTIONS…

Lumen Method —————————————— | Lumen Method |

To Launch the Lumen Method Tool

1. Select LUMEN METHOD from the TOOLS MENU. The Lumen Method Introduction screen will display.
2. Follow the steps to create a rectangular room model. For more information on the Lumen Method Tool, reference section 2.1 – The Lumen Method Tool.

Options —————————————— | Options… |

The OPTIONS Button provides access to the **Options Form** where the global program settings may be modified.

To Launch the Options Form

1. Select OPTIONS from the TOOLS MENU. The **Options Form** will display.

Glossary

Average/min ratio
The ratio of the average value to the minimum value of illuminance found within a statistical or calculation zone. Typically used as an indicator of lighting uniformity.

Ballast
A device used with an electric-discharge lamp to obtain the necessary circuit conditions (voltage, current and waveform) for starting and operating.

Ballast factor
The flux of a fluorescent lamp operated on a ballast as a fraction of the flux when operated on the standard (reference) ballast specified for rating lamp lumens.

Base and destination points
Coordinate locations (X,Y,Z) used to define a relative location or direction. The base point is always the first point entered and typically establishes the reference location. The destination point is sometimes indicative of another location and sometimes, only a direction relative to the base point.

Bulge vector
A line that is drawn from a point to establish the tangency of an arc segment passing through that point.
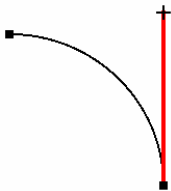
CAD
An acronym for Computer Aided Design, this term generally refers to graphical software used for drafting and solid modeling.

Candela
The unit of luminous intensity.

Candlepower
Luminous intensity expressed in candelas.

Cardinal direction
Any of the fundamental directions defined by the Cartesian coordinate system (X,Y, or Z). The cardinal directions are orthogonal, or perpendicular in nature.

Cardinal plane
Any of the fundamental plane orientations defined by the Cartesian coordinate system (X-Y, Y-Z, or X-Z). The cardinal planes are orthogonal, or perpendicular in nature.

Cartesian coordinates
Numerical values used to define position in three-dimensional space. Based on three orthogonal axes (X, Y, and Z) and an origin. Values may be positive or negative.

Cavity ratio
A number indicating cavity proportions calculated from length, width, and height.

Ceiling cavity
The cavity formed by the ceiling, the plane of the luminaires and the wall surfaces between these two planes.

Ceiling cavity ratio
A number indicating ceiling cavity proportions calculated from length, width, and height.

Coefficient of Utilization
The ratio of lumens from a luminaire as received on the workplane to the lumens emitted by the Luminaire's lamps alone.

Coefficient of variance
A statistic that measures the ratio of the standard deviation over a Calculation or Statistical Zone to the mean value of that Zone.

Coordinate axis/axes
Refers to one (axis) or all (axes) of the cardinal directions defined by the Cartesian coordinate system (X, Y, Z).

Color temperature
The absolute temperature of a blackbody radiator having a chromaticity equal to that of the light source.

Crosshairs
Two thin, intersecting, orthogonal lines affiliated with the mouse pointer in the **Design Environment**. The crosshairs are used to pinpoint locations in the **Design Environment** and provide a visual cue to the plane in which the mouse pointer is moving.

Diffuse reflectance
The ratio of flux leaving a surface or medium by diffuse reflection to the incident flux.

Diffuse reflection
A characteristic of many common architectural finishes whereby light is reflected in a non-directional manner. Matte surfaces/finishes such as tissue paper and flat paint exhibit a highly diffuse reflectance characteristic. See also specular reflection.

Direct component
The portion of light from a luminaire that arrives at the workplane without being reflected by any room surfaces.

Direct-indirect lighting
A variant of general diffuse lighting in which the luminaires emit little or no light at angles near the horizontal.

Direct lighting
Lighting by luminaires distributing 90 – 100% of the emitted light in the general direction of the surface to be illuminated. The term usually refers to light emitted in a downward direction.

Downlight
A small direct lighting unit that directs the light downward and can be recessed, surface mounted, or suspended.

DWG
A file format commonly used in CAD software to store drawing information. Files of this type have .DWG as their file name extension and may be imported into Visual.

DXF
A file format used primarily in CAD software to transfer information from one program to another. Files of this type have .DXF as their file name extension and may be imported into Visual 2.0.

Drop-down menu
A menu option revealed by Left-Clicking the mouse on the down-arrow at the right of certain toolbar buttons.

Effective ceiling cavity reflectance
A number giving the combined reflectance effect of the ceiling cavity.

Effective floor cavity reflectance
A number giving the combined reflectance effect of the floor cavity.

Efficacy
The total luminous flux emitted from a lamp divided by the total lamp power input. Expressed in lumens per watt.

Efficiency
The ratio of lumens emitted by a luminaire to that emitted by the lamp(s) used therein.

Fence
A selection technique whereby objects are added to the selection set based upon their inclusion within a drawn rectangular (fence) region. Objects lying at least partially within the fence are added to the selection set.

Field angle
The angle between the two directions for which the intensity is 10% of the maximum intensity measured in a plane through the nominal beam centerline. Note that in certain fields of applications the angle of the 10%-of-maximum directions was formerly called the beam angle.

Floodlighting
A system designed for lighting a scene or object to a luminance greater than its surroundings. It may be used for utility, advertising, or decorative purposes.

Floor cavity
The cavity formed by the workplane, floor, and wall surfaces between those two planes.

Floor cavity ratio
A number indicating floor cavity proportions calculated from length, width and height.

Fluorescent lamp
A low-pressure mercury electric-discharge lamp in which a fluorescing coating transforms some of the UV energy generated by the discharge into light.

Footcandle
A unit of illuminance. Equal to one lumen per square foot, or 10.76 lux.

High bay lighting
Interior lighting where the roof truss or ceiling height is greater than 25 feet above the floor.

High Intensity Discharge lamp
An electric discharge lamp in which the light-producing arc is stabilized by wall temperature and the arc tube has a bulb wall loading in excess of 3 w/cm2. HID lamps include groups of lamps known as mercury, metal halide, and high-pressure sodium.

Icon
Any graphical symbol used as a means of communication in the computer interface.

Illuminance
The area density of the luminous flux incident at a point on a surface.

Incandescent filament lamp
A lamp in which light is produced by a filament heated to incandescence by an electric current.

Interreflected component
The portion of the luminous flux from a luminaire arriving at the workplane after being reflected one or more times from room surfaces.

Interreflection
The multiple reflection of light by the various room surfaces before it reaches the workplane or other specified surfaces of a room.

Iso-candela line
A curve plotted on any appropriate set of coordinates to show the distances in various directions in space, about a source of light at which the intensity is the same.

Iso-footcandle line
A line plotted on any appropriate set of coordinates to show all the points on a surface where the illuminance is the same.

Iso-illuminance template
A graphical representation of the illuminance produced by a single luminaire object. Lines are used to represent all points of a given illuminance level similar to elevation contours on a topographical map. Iso-illuminance templates are useful in determining the spacing and orientation of lighting equipment prior to system analysis.

Iterative
Repetitious or cyclical.

Lamp
A generic term for an artificial source of light. By extension, the term is also used to denote sources that radiate in regions of the spectrum adjacent to the visible.

Lamp lumen depreciation factor (LLD)
The fractional loss of lamp lumens over the life of the lamp that progressively occurs during lamp operation.

Light
Radiant energy that is capable of exciting the retina and producing a visual sensation. The visible portion of the electromagnetic spectrum extends from about 380 to 770 nm.

Light loss factor (LLF)
The ratio of illuminance for a given area to the value that would occur if lamps operated at their initial rated lumen output and if no system variation or depreciation had occurred.

Linear
Being along a line or straight path.

List box
An entry field with a down-arrow to the right indicating a finite list of options. Left Click on the down-arrow button to reveal and select from among the list of options.

Low bay lighting
Interior lighting where the roof truss or ceiling height is 25 feet or less from the floor.

Lumen
The unit of luminous flux.

Lumen method
A lighting design procedure used for predetermining the relation between the number and types of lamps or luminaires, the room characteristics, and the average illuminance on the workplane. It takes into account both direct and interreflected light.

Luminaire
Any light emitting object, or configuration of light emitting objects, referenced within the Luminaire Schedule Editor in Visual 2.0. Consists of photometric, graphical, and descriptive information.

Luminaire dirt depreciation factor (LDD)
The fractional loss of task illuminance due to luminaire dirt accumulation.

Luminaire label
An alphanumeric designation used to establish a unique correspondence between luminaire symbols and their associated luminaire schedule entries.

Luminaire spacing criterion
A classification parameter for indoor luminaires relating to the distribution of the direct illuminance component produced on the workplane. It used as a guideline for the ratio of luminaire spacing to mounting height (above the workplane) that will result in acceptably uniform illuminance on the work plane.

Luminaire surface depreciation factor
The fractional loss of task illuminance due to permanent deterioration of luminaire surfaces.

Luminaire symbol
The graphic symbol associated with a luminaire object. Used to specify the location and orientation of lighting equipment in application.

Lux
The metric standard unit of illuminance. One lux is equal to one lumen per square meter.

Masking
The process of removing calculation points from an existing calculation zone by selecting a polygonal exclusion region.

Max/min ratio
The ratio of the maximum value to the minimum value of illuminance found within a statistical or calculation zone. Typically used as an indicator of lighting uniformity.

Mounting height
The distance from the floor (or workplane if specified as such) to the light center of the luminaire, or to the plane of the ceiling for recessed equipment.

Nonrecoverable light loss factors
Factors that give the fractional light loss that cannot be recovered by cleaning or lamp replacement, consisting of those components that are due to the lamps operating at other than their rated luminous value.

Photometric file
A data file containing information related to the photometric distribution of lighting equipment. Valid files of this type typically have a .IES extension and adhere to the format outlined in IES LM-63.

Pick-box
A small square located at the center of the mouse pointer crosshairs when in selection mode. The size of the pick-box establishes the precision with which objects must be selected, it can be adjusted within the **Options Form**.

Planar
Two-dimensional in nature. All components lie within a single plane.

Point-by-point method
A lighting design procedure for predetermining the illuminance at various locations in lighting installations, by use of luminaire photometric data.

Point-by-point
A regular sampling of point illuminance values used to establish the nature of lighting levels and uniformity throughout an area of interest. In Visual 2.0, this is the purpose of Calculation Zone objects.

Point source
A source of radiation the dimensions of which are small enough, compared with the distance between the source and the irradiated surface, for them to be neglected in calculations and measurements.

Pole
A standard support generally used where overhead lighting distribution circuits are employed.

Polygon
A closed plane figure composed of line segments with several angles and sides.

Polyline
A graphical entity composed of one or more line segments continuously connected at the endpoints.

Pull-down pallet
A color selection menu option revealed by Left-Clicking the mouse on the down-arrow to the right of certain graphical controls.

Radius
Related to arcs, circles, and spheres. The radius may be used to define the curvature by virtue of the fact that all points on the object are equidistant from a center point. Any straight line from the center to a point on an arc, circle, or sphere.

Recoverable light loss factors
Factors that represent the fractional light loss that can be recovered by cleaning or lamp replacement.

Reflectance factor
The ratio of the flux actually reflected by a sample surface to that which would be reflected into the same reflected-beam geometry by an ideal, perfectly diffuse standard surface irradiated in exactly the same way as the sample.

Room cavity
The cavity formed by the plane of the luminaires, the workplane, and the wall surfaces between these two planes.

Room cavity ratio (RCR)
A number indicating room cavity proportions, calculated from the length, width, and height.

Room surface depreciation (RSDD)
The fractional loss of task illuminance due to dirt on the room surfaces.

Semi-direct lighting
Lighting by luminaires distributing 60-90% of their emitted light downward and the balance upward.

Semi-indirect lighting
Lighting by luminaires distributing 10-40% of their emitted light downward and the balance upward.

Spacing-to-mounting-height ratio
The ratio of the actual distance between luminaire centers to the mounting height above the workplane.

Specular reflection
A characteristic of a surface that reflects light in a directional fashion. Gloss finishes exhibit specular reflective characteristics as do mirrors and chrome. See also diffuse reflection.

Surface mounted luminaire
A luminaire mounted directly on a ceiling.

Suspended (pendant) luminaire
A luminaire hung from a ceiling by supports.

Tangent
Related to a point on a curve, the tangent is given by the direction of a line passing through the point with an orientation perpendicular to the radius at that point. The tangent intersects the curve at only that location.
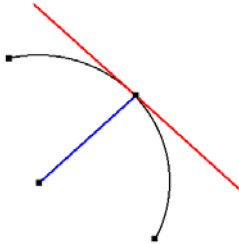
Text box
An entry field that anticipates text entry via the keyboard. Text boxes are activated with a Left Mouse Click and present an "I-beam" cursor for text editing.

Troffer
A recessed lighting unit, usually installed with the opening flush with the ceiling plane.

Uniformity gradient
A statistic that measures the rate of change of illuminance over a Calculation or Statistical Zone expressed as a ratio between the illuminance level of adjacent calculation points.

Window
A selection technique whereby objects are added to the selection set based upon their inclusion within a drawn rectangular (window) region. Objects lying entirely within the window are added to the selection set.

Workplane
The plane at which visual tasks usually performed, and on which the illuminance is specified and measured.

Working plane
The plane of movement of the mouse pointer crosshairs. Working planes are restricted to the three cardinal orientation planes (X-Y, Y-Z, X-Z) in Visual 2.0. The working plane sequentially toggles through the three possibilities whenever the TAB key is pressed. The working plane may be moved incrementally in a perpendicular fashion using the UP and DOWN arrow keys and the HOME key may be used to return the working plane to X-Y at Z=0 (grade level) at any time.

Index