Using Beamline Simulator:

Supplement for V1.4

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1.0 About Release 1.4

Release 1.4 of Beamline Simulator contains a number of enhancements and added features. These improvements are described in this Supplement to the "Using Beamline Simulator V1.3" manual by Kurt Dehnel and Morgan Dehnel. For ease of reference to that manual, the Sections appearing in this "Supplement for V1.4" follow the same numbering. Only Sections that have significantly different features from those in the original manual appear in this Supplement. <u>For example, there is no Section 2.0 in this Supplement as there are no significant changes affecting Section 2.0 of the V1.3 release</u>.

3.0 Starting Beamline Simulator V1.4+

3.1 Security

Beamline Simulator V1.4 and later are distributed on CD-ROM. During the installation procedure, described in Section 3.2 below, you will be asked to enter selected identification User Information, including the serial number of your user license. Beamline Simulator will only run properly if you complete the User Information and enter a proper serial number.

3.2 Installing the Software

Insert the Beamline Simulator CD-ROM into your computer. Your CD folder should look something like that illustrated in Figure 1.
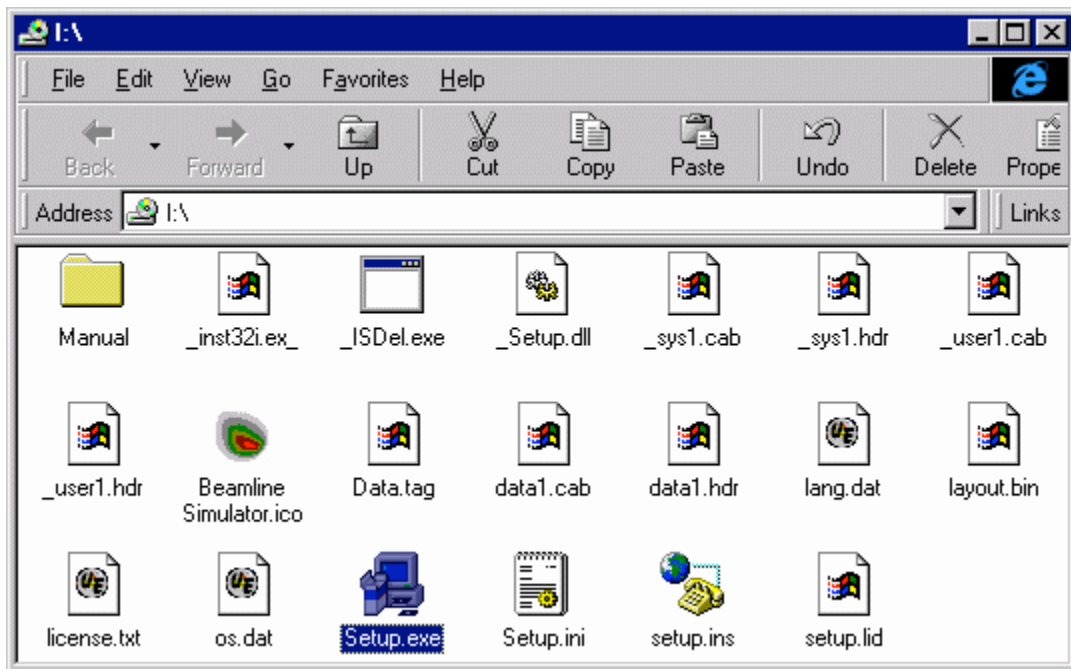

Figure 1. Beamline Simulator installation CD-ROM directory. Double-click Setup.exe to start installation.

After inserting the Beamline Simulator CD-ROM, select the Setup.exe program to begin installation. The Setup program will guide you through the installation procedure. In order for your Beamline Simulator to run correctly, you must enter three (3) items of User Information when asked, as illustrated in Figure 2.
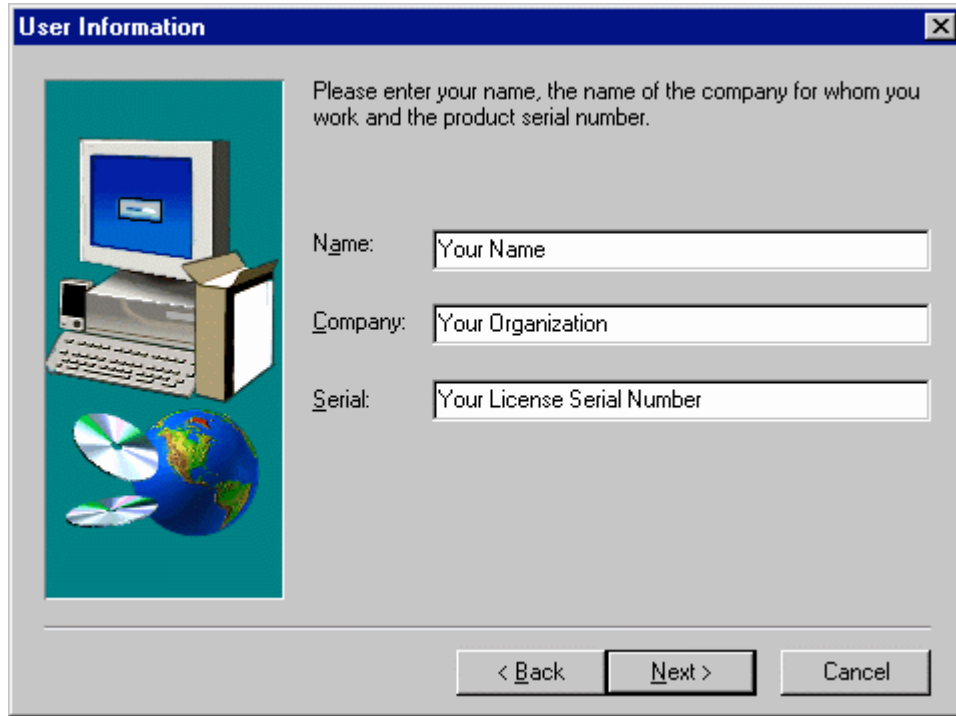

Figure 2. User Information asked for during Beamline Simulator installation. Make sure that your assigned License Serial Number is entered correctly. Your License Serial Number will appear on the original CD-ROM and in selected documentation included with the software.

3.2 Uninstalling the Software

Use the "Add/Remove Programs" application included with your Windows operating System. The Add/Remove Programs application icon is illustrated in Figure 3, and is usually located in the Control Panel folder (directory). The Control Panel folder is usually accessed from the Windows "Start" menu under the "Settings" submenu.

Figure 3. The Wndows Add/Remove Programs application can be used to uninstall Beamline Simulator.

3.3 Running the Program

Beamline Simulator may be run using the same procedure used to run other Windows programs. For example, you may double-click the Beamline Simulator icon located in the Beamline Simulator folder following installation. Alternatively, you may follow the steps outlined in Section 4.1 of the V1.3 manual. Each time you open (run) Beamline Simulator, the Welcome Window dialog with selected User Information will appear. An example of the Welcome Window dialog is shown in Figure 4. Click the "OK" button to begin using Beamline Simulator.
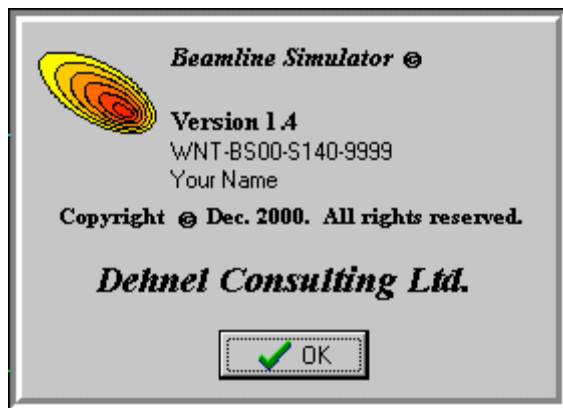
Figure 4. Welcome Window dialog for Beamline Simulator Version 1.4.

5.0 Defining the Beam Source

The Beam Source Form Fill-In procedures for Versions 1.4 and later are the same as that for Version 1.3d. However, in Version 1.4 the physical constraint that the Beam Sigma Matrix must be symmetric has been imposed. All off-diagonal elements in the Beam Sigma Matrix & Half Sizes panel of the Beam Source Form Fill-In window are now automatically symmetric. The imposition of this constraint eliminates any confusion that may arise when attempting to compare to other programs, such as those of the Particle Beam Optics Laboratory (PBO Lab) optics Application Modules. (See the updated File Menu discussion in Section 10.3 of this Supplement for information on exporting Beamline Simulator models for use in PBO Lab.)

In addition to the symmetric constraint on the Beam Sigma Matrix, the text description of the units for the Beam Sigma Matrix has been corrected to read "Matrix units are in millimeter, radians, and fraction." The units for Delta (Half-Size) are percent (%), but those for the 5th row and 5th column of the Sigma Matrix are fractions (or equivalently, radians). These differences need to be kept in mind when entering data corresponding to an initial beam with dispersion.

Figure 5 illustrates an example of the new Beam Source Form Fill-in window for the Beam Sigma Matrix & Half Sizes panel.
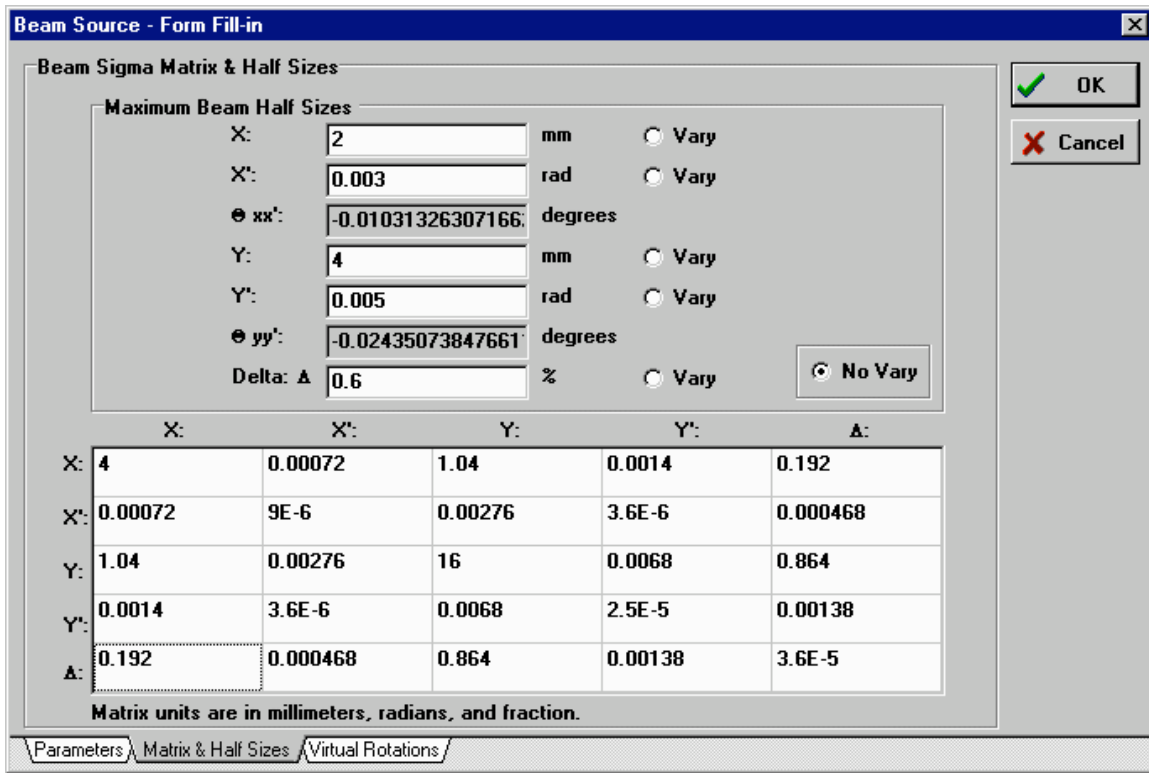

Figure 5. Example of Matrix & Half-Size panel of the Beam Source Form Fill-in for Beamline Simulator Version 1.4. Note that: (a) the input now assures that the sigma matrix will be symmetric and (b) the correct units, fraction, are shown for the 5th row and 5th column of the sigma matrix.

Note: Not all off-diagonal elements of the Beam Sigma Matrix were used in Beamline Simulator 1.3d for particle simulations. The envelope and particle simulations in Version 1.4 are unchanged, so this remains the case for Version 1.4. The Information dialog appearing in Figure 6 is displayed when you enter an off-diagonal beam matrix element that will not be used.
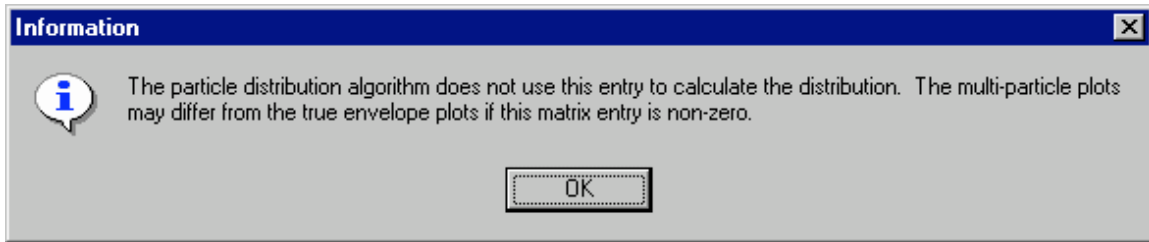

Figure 6. Information dialog, used in both Version 1.3d and 1.4, displayed when an off-diagonal beam sigma matrix element is entered that will not be used for particle simulations in Beamline Simulator.

6.0 The Ion-Optical Elements

There have been no changes to the inputs, the computations, or other features of the suite of optical elements in Beamline Simulator Version 1.4. However, the text description of the units for transfer matrices has been corrected to accurately describe the units for the elements of the 5th row and 5th column. The text description of the units for *all matrix input or display windows* has been corrected in Version 1.4 to read "Matrix units are in millimeter, radians, and fraction." The units for the 5th row and 5th column of all matrix windows in Beamline Simulator are fractions (or equivalently, radians).

Note: Fractions are the units actually used in Version 1.3d for the 5th row and 5th column of all matrices. Those units are now explicitly shown in Version 1.4 and later.   The description "Matrix units are in millimeter, radians, and percent" appearing in Version 1.3d was incorrect.

Figure 7 illustrates an example of the Non-Standard element, an element that permits the incorporation of user defined transfer matrices into Beamline Simulator computations.

Figure 7. Example of Non-Standard element Form Fill-in for Beamline Simulator Version 1.4
Note the correct units, fraction, are shown for the 5th row and 5th column of the transfer matrix.

8.0 Graphics Management

8.2 Choosing Graphics Properties

Beamline Simulator Version 1.4 provides the ability to save and load Graphic Properties that you have set up. When you right click on either of the graphics windows, a pop-up menu appears that provides options for the Graphics Plot windows. Versions 1.4 and later provide two (2) new entries in the pop-up menu: "Save Properties …" and "Load Properties …".   After you have set up the Properties for a simulation, you may use the "Save Properties …" menu item to save those properties for another session.   Figure 8 illustrates the new Pop Up menu for Graphics Plots.
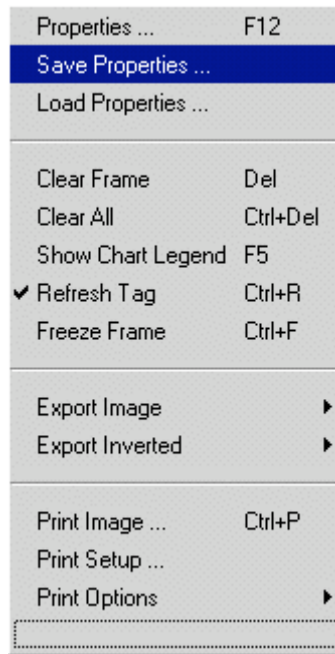

Figure 8. The new Graphics Plot Popup Menu in Beamline Simulator Version 1.4. Version 1.4 now allows you to Save Properties, and then Load those saved properties back during another session.

When you choose the "Save Properties …" menu item a standard Windows file saving dialog opens. After defining a file name for the properties to be saved, use the Save button to create a text (.txt) file with the Properties. You may then reopen that saved file to provide the same Graphics Plot properties for another session, or for another example. There is no limit to the number of Properties files that can be saved, provided a unique file name is assigned to each.

10.0 Command & Tool Reference

10.3 Base Application Window

A new item "Export to PBO-Lab" has been added to the File Menu. This allows Beamline Simulator models to be exported into a file format that can be read by the Particle Beam Optics Laboratory (PBO Lab) software. The File Menu for Beamline Simulator Version 1.4 is illustrated in Figure 9.
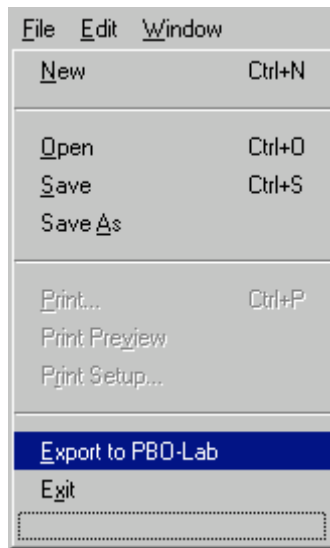

Figure 9. The new File Menu in Beamline Simulator Version 1.4. Version 1.4 now permits the Export of Beamline Simulator Models to a file that can be read by the Particle Beam Optics Laboratory (PBO Lab).

Provide Us Feedback!

AccelSoft updates and improves its software based upon feedback from users. We appreciate hearing from users, who are our best source of ideas for improvements. Please send us an email with comments or suggestions to accelsoft@ghga.com.

Updates are automatically sent to all users whose Technical Support & Product Update Service (TS&PUS) is current. One year of TS&PUS is included free following the initial purchase of a software user license, and the TS&PUS may be renewed annually for a modest fee.