

Section 1 – Introduction

What's In It For You

Stat-Ease welcomes you to version 6 of Design-Expert® software for design of experiments (DOE). Use this Windows-based program to optimize your product or process. It provides many powerful statistical tools:

- Two-level factorial screening studies -- Identify the vital factors that affect your process or product. Then you can make a breakthrough improvement.
- General factorial studies -- Discover the ideal combination of categorical factors, such as source versus type of raw material supply. Identify the vital factors that affect your process or product. *(New!)*
- Response surface methods (RSM) -- Find the ideal process settings. Achieve optimal performance.
- Mixture design techniques -- Discover the optimal formulation.
- Combinations of process factors, mixture components, categorical factors -- Tailor your DOE to what you need to know. *(New!)*

Your Design-Expert program offers rotatable 3D plots for visualization of response surfaces. Use your mouse to set flags and explore the contours on interactive 2D graphs. The numerical optimization function finds maximum desirability for up to dozens of responses simultaneously!

To learn more about the benefits these features provide, work through the tutorials that follow this introductory section. They show you specific ways you can use Design-Expert to your advantage. We strongly recommend that you work the problems on your computer as you read along.

This manual is intended to help you use the software rather than serve as a textbook on DOE. If you need easy-to-read primers on the subject, we recommend two softcover books (available from Stat-Ease):

- *The Experimenter's Handbook* by Kraber, et al ([free to registered users](#))
- *DOE Simplified* by Anderson and Whitcomb (Productivity Press).

More comprehensive textbooks on regression and the statistical aspects of DOE are referenced at the beginning of the Statistical Details: Analysis section of this manual.

What's New

Those of you who've used previous versions of Design-Expert software will be impressed with the many improvements in Version 6. These include:

Additional experimental designs (and capability for analysis)

- General (multilevel) factorials categorical factors
- Combinations of mixture and/or process and/or categorical factors
- Up to 256-run two-level designs with optimum blocking options
- Taguchi orthogonal arrays
- Box-Behnken (RSM) designs for 9 and 10 factors
- Up to 24 components for most mixture designs (not just screening)
- Power calculations included in the sophisticated design evaluation tools.

More flexibility

- Ignore a row of data while preserving the numbers
- Add new factors and blocking to existing designs
- Change factors from numeric to categorical and back
- Define your own generators for fractional factorial designs
- Change models from polynomial (RSM) to factorial and back
- Add integer power terms to a model, for example: quartic
- Select terms for model, error, or to be ignored (allows analysis of split-plot or nested designs)
- Take advantage of many new user preferences, for example: change the significance threshold to 0.01 or 0.1 “p-value” (default is 0.05).

More help

- Greatly expanded context-sensitive help
- Better guidance for choice of model
- Annotated views provide explanation for statistical outputs.

Changes to analysis of variance (ANOVA) output

- Prior to ANOVA for two-level fractional factorials, warning pops up that model is aliased, and opportunity is provided to substitute aliased effects
- F-tests on individual model terms
- Confidence intervals on coefficients.

More graphs

- Predicted versus actual with a 45 degree line
- Box-Cox plot for choosing the best response transformation
- Interaction graphs for RSM (as well as factorial designs)
- Propagation of error (POE) for mixtures (as well as RSM): a big plus for those who are in “six sigma” programs.

Enhancements to numerical optimization

- Include categorical factors
- Set factors at a constant level.

Improved interface

- Standard toolbar added for save, print, etc.
- 32-bit architecture for maximum performance on Win 9x, NT, 2000 and beyond
- Ability to export any grid view as ASCII text, for example: the design layout.

You will see many more improvements, too numerous to list, in this new version of Design-Expert.

Getting Started

The first thing you should do upon receiving Design-Expert is to complete and **RETURN THE REGISTRATION CARD** attached to the license agreement included in this manual. You must return the registration card to validate your warranty, qualify for free program and statistical support, and become eligible for future updates. If this software will be installed on a network, please provide a list of all users, so we can keep them informed of the latest developments.

Version 6 of Design-Expert software comes on CD-ROM (floppy disks available upon request). It's designed to run on 32-bit versions of Microsoft Windows. The CD-ROM includes the following materials:

- Design-Expert installation files
- Tutorials (and other user-guide sections) in Adobe PDF format
- Adobe Acrobat Reader shareware

The hardware and operation requirements are:

- Pentium 200 processor or better recommended (minimum 486)
- A hard disk with at least 20 megabytes free
- Windows 95, NT4 or higher
- Random Access Memory (RAM)
 - 16+ megabytes for Windows 95
 - 32+ megabytes for Windows 98 and NT
- A mouse
- A super-VGA color monitor (800 x 600)

Single-User Installation

Compact Disc (CD)

Insert the CD-ROM into the drive. The installation should automatically start via the auto run feature. If it doesn't start automatically, then

- Open the **My Computer** folder by double clicking the icon on the desktop.
- Open the **CD-ROM** folder in the same manner.
- Launch the **Install.exe** program by double clicking on its icon.

The Stat-Ease logo appears, followed by the main menu, which offers four choices. Click **Install Design-Expert 6**. Choose **OK** to install the software.

Skip ahead to the *License Agreement* section below.

Diskettes

The installation program is also available from Stat-Ease on a set of four diskettes. Furthermore, the standard CD has a utility, *diskette.bat*, which will create the diskette set should you need to install on a computer lacking a compact disc.

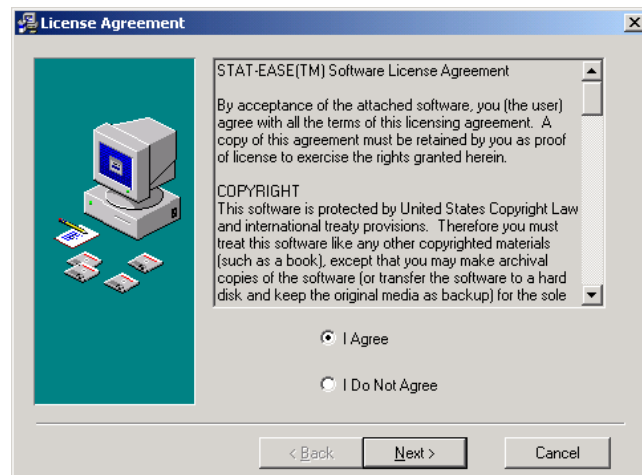
To install Design-Expert, insert the first diskette into drive a: and select **Run...** from the Windows **Start** menu. On the command line type in

```
a:setup
```

and choose **OK**. During the course of the installation you will be prompted to insert the remaining diskettes.

License Agreement

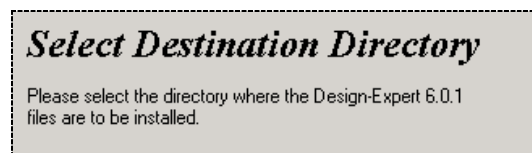
The installation program loads and displays the license agreement. Read the agreement. If you accept the terms, click **I Agree** and press **Next** to continue. If the terms are not acceptable to you, choose **Cancel** to abort the installation.



License Agreement

Installation Steps

Should you accept, a *Welcome* dialog box will appear. Choose **Next** to continue on to the *Select Destination Directory* dialog box.



Select Destination Dialog Box

By default, the software is installed on **C:\Program Files\DX6**. If you want a different directory, use the **Browse** option to select your desired location. Choose **Next** to continue.

You will now be asked where you want the dynamic link libraries (dll's) stored. The default is the system folder – a common area for all dll's. However, you can opt to segregate the DX6 dll's by placing them in its program directory.

Select DLL Location

Many common functions are contained in a single Dynamic Link Library (DLL) which can be shared by several programs running simultaneously. To avoid multiple versions on your computer, DLLs should reside in the system folder.

WARNING: For NT 4.0 and Windows 2000 you may need an administrator account to install files in the system folder. Your company policy may require an IT administrator to perform this install.

Please select the folder where the DLLs needed for Design-Expert 6.0.1 are to be installed:

System* (C:\WINNT\System32)

Program (C:\Program Files\DX6)

*Recommended

Select DLL location

We recommend you put the dll's in the system folder to ensure that a compatible version will be loaded. If your company policy does not permit this, you can put them in the program folder. (This will work unless another program has loaded an earlier incompatible version. In that case you will get an error message when you launch Design-Expert, which can be avoided only if you exit the conflicting program. These are good reasons to follow our recommendation and put all dll's in the system folder.) Press **Next** to continue.

Your next step is the **Registration Information** dialog box. Fill in your name, organization name, and product serial number. Choose **Next** to continue.

Registration Information

Please enter the name and company of the registered owner and the serial number of the Design-Expert 6.0.1 software into the fields below.

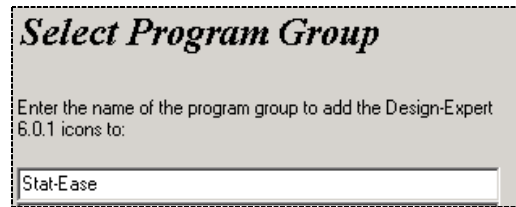
First name: Last name:

Registered user's company name:

Serial number: The product serial number can be found on either the registration card or the license envelope.

Registration Information Dialog Box

The **Backup Replaced Files** dialog box will offer you an opportunity to backup any files that it might replace during the installation process. Unless you want to backup a previous DX6 installation, say **No**. If you do say Yes, the **Select Backup Directory** will ask you where to put them. As usual, choose **Next** to continue.



Select Program Group Dialog Box

The **Select Program Group** dialog box will prompt you for a start menu group name. The default adds a Stat-Ease group to your Start menu under the Programs submenu. Design-Expert is in that group. A “Design-Expert 6” menu item will be added to the Add/Remove Programs list in case you want to remove the Design-Expert software from your computer.

The program is now ready to be installed. Choose **Next** to begin the copying process. Then click **Finish** to return to the main menu. You then will be asked to consider registering the software on-line. We urge you to do so, but you may elect to register by printing out the form and faxing it in or taking advantage of the handy postcard included with the manual.

Select **Exit** when finished with the installation program.

How to Uninstall the Program

To uninstall Design-Expert software, use the **Add/Remove Programs** utility under the Windows Control Panel. Choose the **Install/Uninstall** tab. Then select the program from the list and click **Add/Remove**. Follow the instructions to remove the program.

Network Installation

Design-Expert software runs on NT, Novell, and other common networks. Please limit concurrent usage to the number of seats purchased. Also, we ask that you provide Stat-Ease with a list of all likely users, so we can keep them informed on the latest developments via our newsletter.

To install the software on a network, you will need to have purchased the network installation of Design-Expert. The CD is identified with the words “Network Version” on its label.

Insert the CD-ROM into the drive. The installation should automatically start via the auto run feature. If it doesn’t start automatically, then

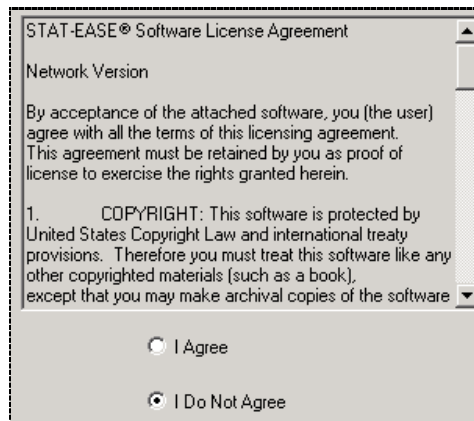
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- Open the **CD-ROM** folder in the same manner.
- Launch the **Install.exe** program by double clicking on its icon.

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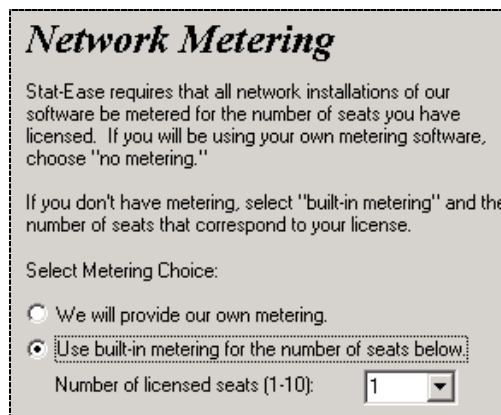
License Agreement

The installation program loads and displays the license agreement. Read the agreement. If you accept the terms, click **I Agree** and press **Next** to continue. If the terms are not acceptable to you, choose **Cancel** to abort the installation.



License Agreement

A Welcome screen now appears. Press **Next** for choices on how to set up network metering.



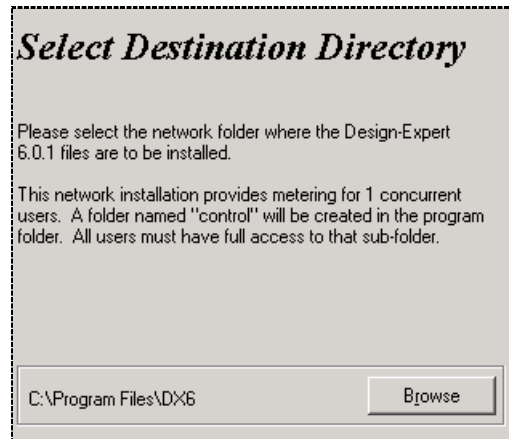
Network Metering

If you have your own metering software, choose “We will provide our own metering.” If you don’t have metering software, choose “Use built-in metering...” and select the number of copies you have purchased. For more information on the built-in metering, see the section titled, **Network Installation with Built-in Metering**, in the appendix.

Note: For network installations, Stat-Ease requires that you limit the number of concurrent users to the number of seats you have purchased.

Installation Steps

Next select the destination directory on the network drive. That folder should be designated read-only to the users, but they must have full access to the **control** sub-folder.



Select Destination Directory

Proceed with the installation filling out the registration information and optional file backup. The installation program will copy the program files to the directory along with a workstation setup program, WrkSetup.exe. When it has completed copying the files, the setup will set the attributes of all the files to read-only. If you need the files to be read/write, select all files in Windows explorer, right click and choose Properties. Clear the check mark on the Read Only choice and click on Apply.

Another file, custdata.ini, contains the registration information you entered for this product (name, company, and serial number). You can edit this file with notepad (or some other suitable editor) if changes are needed. Note that the workstation setup program uses the serial number in this file. If it is invalid, users will be asked for the correct number every time they launch the program. *Be sure the serial number is entered correctly!*

Workstation Setup

To set up a workstation, log into the network resource from the workstation and run WrkSetup.exe from the Design-Expert folder. It will set up the program group, shortcuts, and install local dll's (optional). You will need to run this setup program from each machine that will be accessing the network copy of the program.

If the User Guide folder has been installed in the Design-Expert folder under the default name of "User Guide," the workstation setup will create a shortcut to it as well.

Making the User Guide Available to Network Users

We recommend that all users be given access to a written manual. Call Stat-Ease to purchase additional copies. However, as an option, you can store the manual in

electronic form and view it with Adobe's Acrobat Reader. If you do not already have this software, click **Install Adobe Acrobat Reader**.

The manual and tutorials are included on the CD in Adobe's portable document format (pdf). They can be installed on your system using the "Install User Guide" button on the Stat-Ease main menu.

To view the manual, double click on the **User Guide** icon in the Stat-Ease group. Adobe Acrobat Reader is launched automatically.

- Or -

Click on the Adobe Acrobat Reader software icon; next click on **File, Open** and select the section you want to view (labeled *.pdf) from the **DX6** directory. The rest is self-explanatory.

Users may find it easier to print the contents so it can be referred to while operating the Design-Expert program. In any case, they will need the reader program to view or print the tutorials.

Other Considerations

If Design-Expert is installed on a read-only network drive, someone with system administrator authority will need to enter the serial number when prompted.

In general, install Design-Expert in a network directory with read and directory list privileges. Each workstation will need its own program item (and program group, if desired).

On a Novell network, install Design-Expert in your application folder under the subfolder, dx6. Set the file permissions to R and S (Read and Show).

Running the Program

A Stat-Ease program group is set up under Programs in the Start menu. There are several shortcuts in that group including the Design-Expert program, Read Me file, and Manual/Tutorials group (an option described above).

Design-Expert has a number of built-in icons to choose from. The default icon is a 256 color adaptation of the "ball in the cube" logo (a miniature version of the cover art on the software binder).



Default Icon

If your computer is set at 16 colors for icons, you will get a lower resolution icon that doesn't look as good. See the Appendix for information about how to change your

computer's desktop to display 256 icon colors and/or change to alternative icons. Simply click on the Design-Expert icon to execute the program.

How to Get Support

Before calling for support, be sure to look at:

- The “Program Hints and FAQ” section in the Design-Expert program Help. (Frequently asked questions (FAQ) can also be found in the “Read me” file installed in your Stat-Ease folder).
- The Stat-Ease website (listed below) for downloadable program patches (free!) and updated documentation (in portable document file (PDF) format readable with free Adobe Acrobat Reader, version 4).

To obtain support from Stat-Ease, you must be a registered software owner, or user on a licensed network. The quickest way to get help is to call us, but e-mail also works well because you can attach your data file. Please provide your Design-Expert version number and serial number before stating your question.

We do provide limited free help of a statistical nature. It never hurts to ask! However, we may suggest that you purchase some statistical consulting. Often, we can give you invaluable help with only a few hours of paid time. For a free cost estimate (and perhaps a free answer to your problem!), give us a call and ask for statistical help. Here's how you can reach us:

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