

## Getting Started with Version 7.1 of Design-Expert® Software

### What's in it for You

Stat-Ease welcomes you to version 7.1 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 designs: *Identify the vital factors that affect your process or product so you can make a breakthrough improvement,*
- General factorial studies: *Discover the best combination of categorical factors, such as source versus type of raw material supply,*
- Response surface methods (RSM): *Find the optimal process settings to achieve peak performance,*
- Mixture design techniques: *Discover the ideal recipe for your product formulation,*
- Combinations of process factors, mixture components and categorical factors: *Mix your cake (with different ingredients) and bake it too!*

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 dozens of responses simultaneously!

To learn more about the benefits these features provide, work through the tutorials included with your installation CD-ROM and posted at our website [www.statease.com](http://www.statease.com) (more on this a bit later). They show you specific ways you can use Design-Expert to your advantage. The tutorials teach you how to use the software rather than DOE itself.

In addition, you will find a wealth of statistical details within the program itself via various Help screens. Do not overlook the gold-mine of information that lays literally at your fingertips only a few keystrokes away.

For a helpful collection of checklists and 'cheat sheets,' see *The Handbook for Experimenters* by Kraber, et al which comes free to all registered users. Furthermore, for quick primers on the principles of design and analysis, we recommend you read these two soft-cover books from Stat-Ease Principals Anderson and Whitcomb – published by Productivity, Inc of New York:

- *DOE Simplified: Practical Tools for Effective Experimentation,*
- *RSM Simplified: Optimizing Processes Using Response Surface Methods for Design of Experiments.*

For something more academic on DOE, refer to:

- *Design and Analysis of Experiments*, Montgomery
- *Response Surface Methodology*, Myers and Montgomery
- *Experiments with Mixtures*, Cornell
- *Experimental Design for Formulation*, Smith.

Go to <http://www.statease.com/prodbook.html> for details on all six books listed above. You can then order them online using the Stat-Ease e-commerce site.

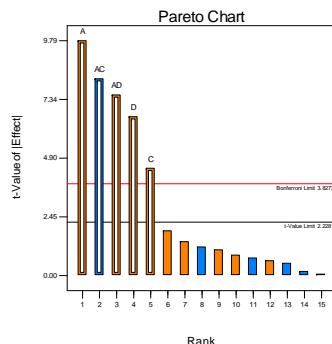
### What's New – The Highlights\*

*\*(See the Appendix for more details.)*

Those of you who've used previous versions of Design-Expert software will be impressed with the many improvements in Version 7. Here are the highlights broken out in two stages, V6 to V7.0 (huge improvement!) and to V7.1 (a valuable upgrade).

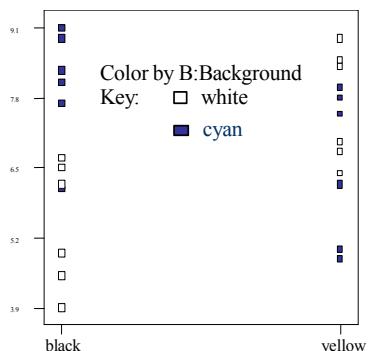
#### From V6 to V7.0

- Pareto chart of t-values of effects: *Quickly see the vital few effects relative to the trivial many from two-level factorial experiments,*



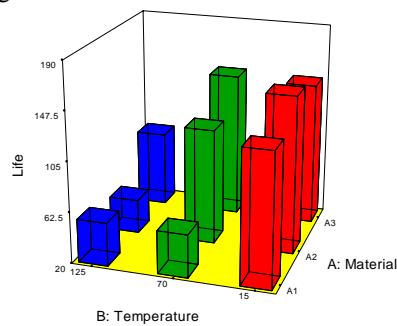


- New “Color By” option: *Color-code points on graphs according to the level of another factor – a great way to incorporate another piece of information into a graph,*



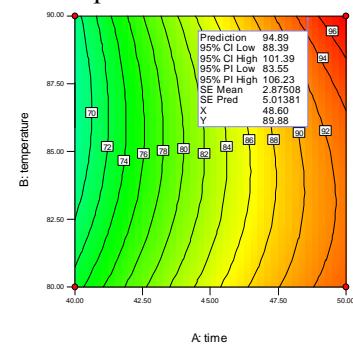
A:Foreground on VDT

- Right-click on any response cell and “ignore” it: *Previously one had to ignore an entire row in the design matrix, even though one or more of the responses may’ve been good data,*
- “Screen tips” ⓘ: *Press the new tips button for enlightenment on the current screen – especially helpful for novice users,*
- 3D surface plots for categorical factors: *See colored bars towering above others where effects are greatest,*



- “Min-Run Res IV” (MR4) two-level factorial designs for 5 to 50 factors: *Screen main effects with maximum efficiency in terms of experimental runs,*

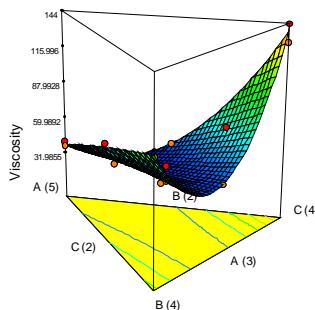
- “Min-Run Res V” (MR5) designs for 6 to 34 factors: *Resolve two-factor interactions (2FI's) in the least runs possible while balancing the low versus high levels,*
- Two-level fractional factorials for up to 512 runs and 21 factors: *Build bigger designs than ever-before possible,*
- On plots of effects simply draw a box around the ones you want selected for your model: *This is much easier than clicking each one with your mouse,*
- CCD's based on MR5 fractional-factorial core – **up to 50 factors (V7.1)**: *Take advantage of a much more efficient design for larger numbers of factors,*
- Box-Behnken designs expanded up to 21 factors: *This popular RSM previously was limited to certain numbers of factors, but it's no longer the case,*
- Crosshairs window: *Predict your response at any place in the response surface plot,*
- Full-color contour and 3D surface plots: *Graduated or banded colorization adds life to reports and presentations,*



- Magnification feature: *Incredible tool for expanding a mixture graph that is originally a small sliver and difficult to interpret,*
- Mixture-in-mixture designs: *Develop sophisticated experiments for immiscible liquids or multilayer films involving separate formulations that may interact,*

- Mixture design-builder recognizes inverted simplexes ( ) and constrained regions that benefit by being inverted: *This provides dramatic advantages in the power for estimating model terms,*
- Add blocks D-optimally: *This will be especially useful for mixture designs, which previously could not be blocked automatically,*

- Points on 3D graphs: *See 'lollipops' protruding from surfaces where actual responses were collected,*



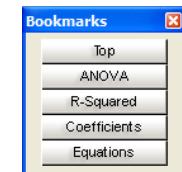
- Row(s) in design layout highlighted when point(s) selected on diagnostics: *The highlighting feature makes identification of problematic data much easier,*
- Numerical optimization solutions are now carried over to graphical optimization and point prediction: *Explore the results of the numerical optimization on other screens.*

## What's New in V7.1

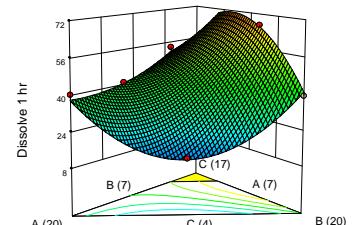
- Upfront power calculation for factorial designs: *This builds in a 'heads-up' on the percent probability of seeing the desired difference in each response – the signal – based on the underlying variability – the noise,*

Responses:	1	(1 to 999)	<a href="#">Edit model for power...</a>		
Name	R1	Units	Diff. to detect Delta("Signal")	Est. Std. Dev. Sigma("Noise")	Delta/Sigma (Signal/Noise Ratio)

- Bookmarks for reports with toolbox to facilitate selection: *This will save a lot of time scrolling through long statistical outputs such as the design evaluation and analysis of variance (shown at right),*

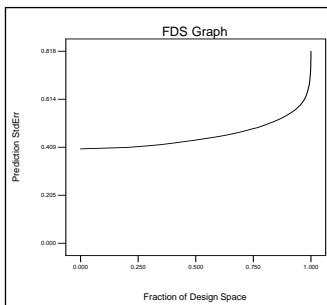


- Display grid lines on 3d-graph back-planes: *Provides better perspective on the varying height of a response surface such as the one pictured for a constrained mixture,*
- Simple ratio constraints, such as  $A/B > 1$ , can be entered in directly: *This sort of thing is fairly common, for example, A might be air pressure upstream of a check valve and B the pressure after, but it will work only when A exceeds B – ratios are especially handy for mixtures with components that require certain stoichiometries,*
- Saving graphs to files in enhanced Windows metafile (EMF), PNG, TIFF, GIF, BNP, JPEG and encapsulated Postscript (EPS): *Many publications do their artwork in one of these alternative formats,*





- Fraction of design space (FDS) graph for design evaluation: *This enhancement, suggested to us by DOE guru Douglas Montgomery, provides very helpful information for comparing alternative test matrices – simple enough that even non-statisticians can see differences at a glance and versatile for any type of experiment – mixture, process or combined,*
- Design layout can now be modified via a right-click list with added columns for point type and other alternative attributes: *Make your ‘recipe’ sheet more informative,*
- Add “design model” choice for statistical analysis: *Handy for data from experiments based on a computer-generated D-optimal design.*



## Getting Started

The first thing you should do upon receiving Design-Expert is to **register your copy**. Either complete and submit the online registration form, or complete and return the registration card attached to the license agreement included in this manual. You **must** register the software 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 7 of Design-Expert software is shipped on a Compact Disk (CD) and can be downloaded via the Internet. It is designed to run on 32-bit versions of Microsoft Windows. The CD includes the following materials:

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

Hardware and operating system requirements are given in the following table:

Component	Minimum	Recommended
<b>Processor</b>	Pent Pro 266 MHz	≥Pent IV 1 GHz
<b>Hard Drive</b>	40 MB free space	≥40 MB
<b>RAM</b>	128 MB Win 98 SE/ME 192 MB Win 2000 256 MB Win XP	≥128 MB Win 98 SE/ME ≥192 MB Win 2000 ≥256 MB Win XP
<b>Display</b>	800x600	≥1024x768
<b>OS</b>	Windows 98 SE	≥ XP or later (Vista)

### 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 its icon.

The Stat-Ease logo appears, followed by the main menu, which offers four choices. Click **Install Design-Expert 7**. Choose **OK** to install the software.

Skip ahead to the **License Agreement** section below.

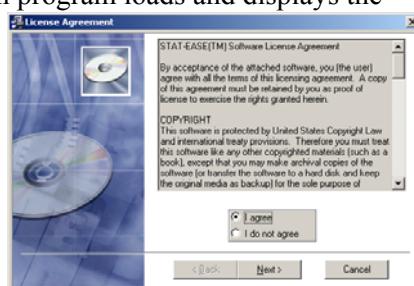
#### Internet Download

If you purchased the software via the web and chose the download option, the installation is transmitted in a single **exe** file named **dx7single-esd**. Using Windows Explorer, locate this file in your chosen download folder and double click on it to begin the installation. The Stat-Ease program group in the Start menu will contain a shortcut named "...Installation Notes..." that

should be referred to for instructions specific to downloaded software (versus details below that relate more to content delivered via CD-ROM).

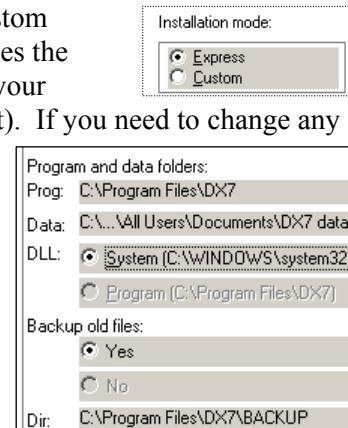
### License Agreement

Once launched, 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.



### Installation Steps

Should you accept, a **Welcome** dialog box appears offering you the choice of either Express or Custom installation. The express option uses the recommended default settings for your installation (pictured in screen shot). If you need to change any of these settings, go back and choose the custom installation and a series of dialogs will lead you through those choices.



Next you are asked to provide the **Registration information**. Fill in your name, organization, and serial number.

The program is now ready to be installed. Choose **Next** to begin copying it. Then click **Finish** to return to the main menu.

Once installed you will be asked to activate the software. *Note: If you cannot connect to the Internet or call Stat-Ease, then skip the activate step (uncheck it) until you run the program.* Consider registering the software online now or uncheck it and simply fill out and mail the handy postcard registration that came with your CD-ROM. To register later via the Internet, open the "Read Me" file in the

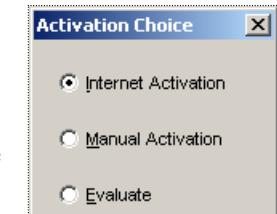


Stat-Ease program group and click the link labeled [www.statease.com/dx\\_register.html](http://www.statease.com/dx_register.html).

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

### Activating the Program

If you did not choose to do so during installation, then the first time you run the program you will be asked to activate it by one of three choices: Internet, Manual, and Evaluate. (Choosing this last option allows use for up 45 days, during which you can activate any time via the Help menu).

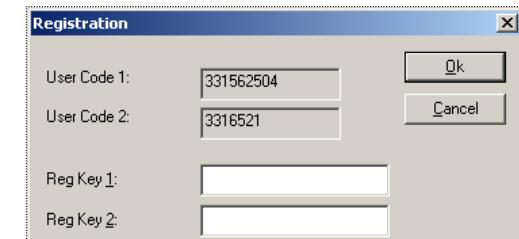


The first choice is Internet Activation.

Enter the password you were sent with the product serial number and Click **OK**.



Providing the codes are valid, you will be immediately activated. Internet Activation is the quickest and easiest way to enable Design-Expert.



If your computer isn't connected to the Internet, then you must choose Manual Activation. Send Stat-Ease the two User Codes (1 and 2) in the Registration dialog along with your serial number and we will give you the necessary Reg Key(s). You may do this by phone, fax or e-mail to [support@statease.com](mailto:support@statease.com). Since there may be a delay in getting your registration keys, you can run the program in Evaluate mode for up to 45 days until the program is activated.

### How to Uninstall the Program

When you uninstall the program, you will be given the opportunity to deactivate it first. This facilitates reinstallation on another computer by obviating the need to contact Stat-Ease for



manual reactivation. Have the password handy before you uninstall – it is with the serial number on the label affixed to the original packaging.

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.

## Running the Program

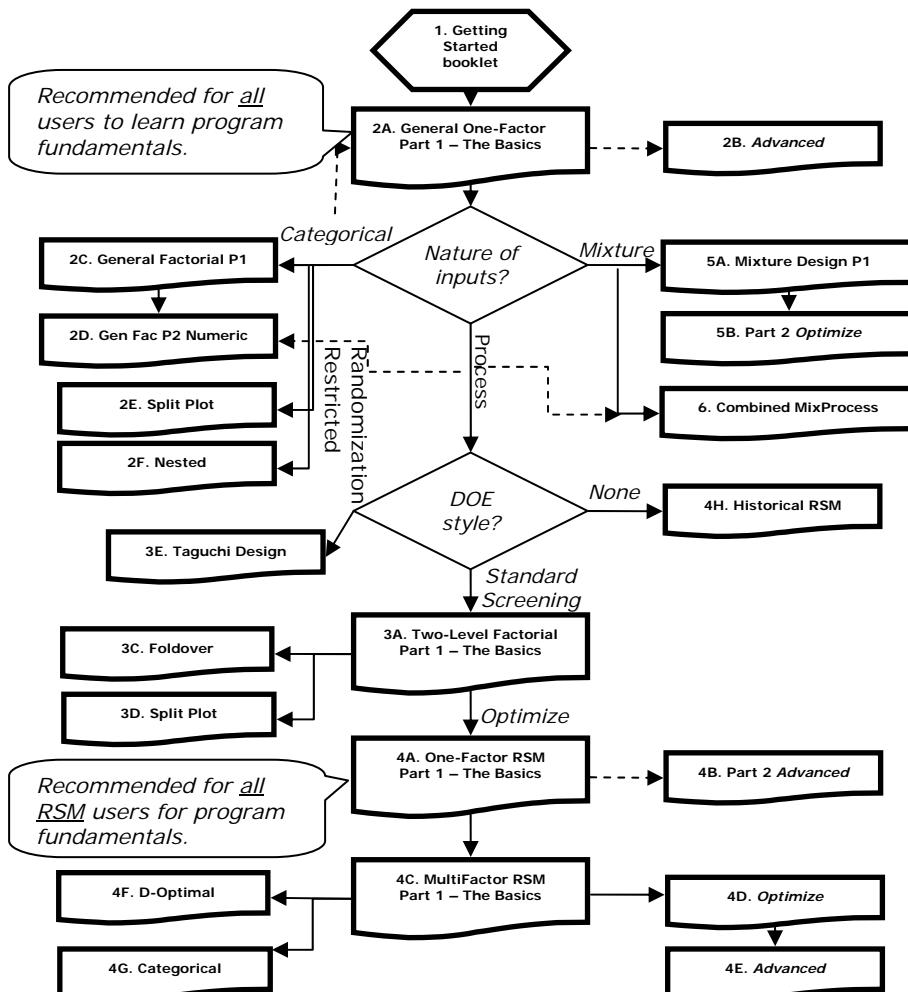
A Stat-Ease program group is set up under Programs in the Start menu. There are several shortcuts in that group including the Design-Expert program, Read Me file, and Manual/Tutorials group (an option described above). Simply click on the Design-Expert icon to execute the program. If your computer is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



## How to Access Tutorials

Included on the installation CD-ROM are tutorials in Adobe Acrobat's portable document format (pdf) that you can view with their free Reader software available via Internet at (<http://www.adobe.com/products/acrobat/readermain.html>).

The following flowchart provides guidance on choosing tutorials. The titles correspond with the names for the portable document files.



## How to Get Support

Before calling for support, be sure to look at:

- ◆ The tutorial “DX7-02A-Gen1Factor-P1”. Where you go from there in the User Guide depends on what sort of experiment you must design and analyze.
- ◆ 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 web site (listed below) for downloadable program patches (free!) and updated documentation (in portable document file (PDF) format readable with free Adobe Acrobat Reader).

To obtain program 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.

Here's how you can reach us:

Website: [www.statease.com](http://www.statease.com)  
By mail: Stat-Ease, Inc.  
2021 East Hennepin Ave, Suite 480  
Minneapolis, MN 55413

Phone: (612) 378-9449  
Fax: (612) 378-2152  
E-mail: [support@statease.com](mailto:support@statease.com)

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, or e-mail: [stathelp@statease.com](mailto:stathelp@statease.com)

## Appendix: Network Installation

Design-Expert software runs on Windows, 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 not, 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 7**. Choose **OK** to install the software.

### License Agreement

The installation program first displays the license agreement. Read the agreement. If you accept the terms, click **I Agree** and press **Next** to continue. Otherwise, choose **Cancel** to abort the installation.

For network installations, Stat-Ease requires that you limit the number of concurrent users to the number of seats you have purchased. We provide built-in metering for that purpose. For information on that, see the section titled, **Network Installation Notes** further along in this appendix.

The activation code provided by Stat-Ease will automatically set the built-in metering for the number of seats you have purchased. If you have your own metering software and wish to use that instead, please contact us for a new activation code.

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.

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.

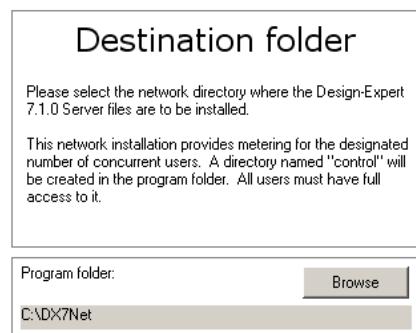
Another file, **custdata.ini**, contains the registration information you entered for this product (name, company, and serial number). You can edit this file with notepad (or some other suitable editor) if changes are needed. Note that the workstation setup program uses the serial number in this file. 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!*

#### Activation

As with the stand-alone version, the network version must be activated by an administrator. Launch the program from a remote workstation (not the server console) and activate either via the Internet or manually as described in the instructions for the stand-alone version.

#### Workstation Setup

To set up a workstation, log into the network resource from the workstation you are setting up and run **WrkSetup.exe** from the Design-Expert folder. It will set up the program group and 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.

In addition to choosing Express or Custom settings, you can select either a *server*- or *client*-based configuration.



If you choose the server-based configuration, the program will be launched from the server each time.

A client-based configuration copies the program and help files to your local hard drive. Design-Expert will then run from your local drive after it checks for an available license on the server. This option may be desirable if you have a sluggish network connection.

**Caution:** If you perform a client install you will need to repeat that installation for any upgrades. This doesn't need to be done all at once, though, as the older version will continue to run.

#### 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 DX7 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, *dx7*. Set the file permissions to R and S (Read and Show).

If this installation is an upgrade from a previous version, please uninstall the older one after you get Design-Expert running properly.

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### Files

Installed in the Design-Expert program folder are:

- **dx7.exe**, main program (single user only)
- **dx7net.exe**, main program (network installation only)
- **dx7.helpfile.chm**, HTML-based help file
- **custdata.ini**, customer data used by DX7
- **read\_me.htm**, program update info and tips
- **user.ini**, Design-Expert 7 license file
- **license.txt**, Design-Expert 7 license agreement
- **unwise.exe**, WISE Uninstaller—used to remove DX7
- **install.log**, installation log file used by unwise.exe

Installed in either the Windows/WinNT system32 folder or Design-Expert program folder depending on the user's choice (always installed in the program folder if network version) are:

- **mfc42.dll**, Microsoft Foundation Class 4.2 library
- **msvcp60.dll**, Microsoft Visual C++ 6.0 library

- **msvcrt.dll**, Microsoft Visual C run-time library
- **roboex32.dll**, RoboHelp helper
- **keylib32.dll**, license key library.

Intel Math Kernel Library (MKL):

- **libguide40.dll**
- **mkl\_\*.dll**, 11 files.

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### Network Installation Notes

Design-Expert software runs on Windows, Novell, and other common networks. By default, the program uses the built-in metering to limit concurrent uses to the number of available seats. If you prefer to use your own license control system, please contact us for proper authorization.

#### Central (Server-Based) vs Distributed (Client-Based)

Our standard network installation copies the program files to a shared folder on a central server. Included in that folder is a workstation setup program, **WrkSetup.exe**, which creates local shortcuts, a data directory, and (optionally) installs the **DLLs** to the local machine. In this case, the network acts as a file server for Design-Expert. When users run the program from a workstation, the **.EXE** is loaded into the local machine's memory across the network.

The built-in metering, which will limit the number of concurrent users to the number of seats you purchase, employs a control folder to manage the license. Users must be given full access to this folder. When Design-Expert is launched, it checks for an available seat. If one exists, the program loads--otherwise, the message "User Limit Exceeded! Maximum license(s) (#) in use." is issued, and access is denied ("#" refers to the total number of available licenses).

The server-based scheme may be too slow for users on a low-speed connection to the network, so alternatively you could install individual copies on each workstation, regulated by a central metering system. Under this distributed network scheme, the program is launched from the local drive only after checking

with the server for an available seat. The built-in metering supports this model and you can choose it when you run the workstation setup.

## Operation

When the network version of Design-Expert is launched, a semaphore file is written to the **control** folder. As other copies are launched, each creates its own semaphore as long as the number of licenses has not been exceeded. If all licenses are in use when a user tries to launch Design-Expert, a message is displayed and access denied.

For the metering to work properly, the user must have read / write access to the **control** folder. Furthermore, the correct license file, **user.ini**, must be located in the control folder, and the files, **machnm1.exe** and **keylib32.dll**, must be located either in the program or the system32 folder. If any of these are missing or incorrect, an error will be displayed and the program will not run.

## Control Path

By default, the control path is a folder named “control” that resides within the Design-Expert application folder. If you prefer a different location, you may specify it in the network section of **custdata.ini** file with the following entry:

```
[Network]
ControlPath=<path>
```

where **<path>** is the path (either absolute or relative from the program folder) that includes the folder name. For example:

```
ControlPath=\\SERV6\\APPL\\DX7_Control
```

Whatever control folder you choose, it must exist before you launch Design-Expert or the program will terminate stating that no more licenses are available.

## License File

If you do not specify a control path the active license file, **user.ini**, will be located in the DX7Net application folder. If you specify a control path, including “.\Control”, the active license file will be located in that path.

## Network Type

There are three recognized network types, “server,” “client,” and “any.” With the “server” type, only a server-based install is available via the workstation setup as the client-based option is disabled. The “client” type allows only the client-based configuration, while the “any” choice allows workstations to be set up in either configuration. By default, the network type will be set to “Any” if you are using the Stat-Ease built-in metering or to “Server” if you are using your own metering. This option is in the **custdata.ini** file under the network section.

```
[Network]
NetworkType=<type>
```

where **<type>** is “Server”, “Distributed”, or “Any”. For example:

```
NetworkType=Any
```

“Any” is the default value if NetworkType is not found in the network section of the **custdata.ini** file.

## Network Path

If you choose to install the program on the workstation drive, a local **custdata.ini** file is created that contains the following lines:

```
[Network]
NetworkPath=<path>
```

where **<path>** is the path (either absolute or relative from the program folder) to the application on the server. For example:

```
NetworkPath=\\SERV6\\APPL\\DX7Net
```

All other information normally found in the **custdata.ini** file will be in the copy that resides in the application folder on the server.

## File Overwrite

On networks with restrictive combinations of share and security privileges, users may not be able to save over an existing file unless the following directive is added to the **custdata.ini** file:

```
[Network]
DeleteBeforeSave=1
```

This is the default setting for a network installation, but not for a single user install. If you are using a standalone copy of Design-Expert and writing to a network drive, you may need to add these lines to your **custdata.ini** file. Simply change the value from “1” to “0” if you wish to disable this feature.

## Diagnostic Aids

To identify problems with access to Design-Expert from a workstation, view these two registry entries: **ShowPaths** and **TestControl**. These are DWORD values that you can create in the HKEY\_CURRENT\_USER hive of the workstation registry under the key, Software\Stat-Ease\Design-Expert 7\Test.

**ShowPaths** is a DWORD value that when set to 1 will display on startup the paths the program is expecting:

```
Program: \\Win2ksrv\DX7Net\  
License: \\win2ksrv\control\user.ini  
Custom: \\Win2ksrv\DX7Net\CUSTDATA.INI  
Network:  
Control: \\win2ksrv\control  
Help: \\Win2ksrv\DX7Net\DX7Helpfile.chm
```

**TestControl** is a DWORD value that when set to 1 will attempt to write a dummy file to the control folder. A message tells you if it was successful or not. A failure indicates you the user do not have the necessary write access to the folder.

You can disable either of these diagnostics by setting them to 0.

## Automating the Client Install

The client install (**WrkSetup.exe**) can be customized to specify new default settings for client type, DLL location, local program folder, local data directory, HTML help zone, program group, and network path. You can also perform a silent install (no user interaction or screen display). If you would like documentation on this, please email [support@statease.com](mailto:support@statease.com).

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## Appendix: More of What's New\*

\*(In addition to the list in **What's New – The Highlights**)

### New Design Creation

- Design-builder updates resolution of two-level fractional factorials when number of blocks changed: *Immediately see how segmenting a design might reduce its ability to resolve effects,*
- Block names now entered during design build: *Identify how you will break up your experiment, for example by specific shift, material lot or the like,*
- “Min-Run Res IV plus two” option: *Ask for two extra runs to make your experiment more robust to missing data,*
- User-defined base factors for design generators: *More flexibility to customize fractional factorial designs,*
- Expanded D-optimal capabilities – impose balance penalty, force categoric balance: *This feature helps users equalize the number of treatments,*
- CCD's offer new alpha choices of “Practical,” “Orthogonal Quadratic” and “Spherical”: *Develop more control over where you put your ‘star’ points,*
- Coordinate Exchange capability for D-optimal designs: *Avoid the arbitrary nature of designs constructed from candidate point sets,*
- In General or Factorial D-optimal designs, categorical factors can be specified as either nominal or ordinal (orthogonal polynomial contrasts): *This affects the layout of analysis of variance (ANOVA),*
- Specify the same amount for low and high in mixture design: *Handy for keeping track of fixed component levels – these do not appear in the model.*

## New Design Augmentation Tools

- “Semifold”: *In only half the runs needed by a normal foldover, augment Res IV designs to resolve specified 2FI's aliased in the original block of runs,*
- Add center points, blocks and replicates without rebuilding the design: *This will be a real time-saver,*
- When breaking an existing design with center points into blocks, choose to distribute them evenly or D-optimally: *Choose between practicality (even distribution) versus statistical criterion (D-optimal).*

## New Analysis Capability

- From Alias List, Pareto chart or Effects Plots views, right-click on effects to show aliases: *Never lose sight of what really is being measured in fractional-factorial designs,*
- Select alternative aliased effects: *Choose what you think makes most sense based on your subject-matter knowledge,*
- Backward stepwise regression now applicable to factorial designs: *Useful for quickly analyzing general (categorical) factorials,*
- Means and standard deviations for all experimental inputs (factors) and outputs (responses) added to Design Summary screen: *Provides a handy assessment of your system,*
- User can define preference for sums of squares calculations for both numeric and categoric factors to be sequential, classical, or partial: *These distinctions are important for statisticians who want to do ANOVA in specific ways,*
- Cox model option for mixtures: *May be more informative for formulators with a standard (reference) blend to which they'd like to compare more-optimal recipes.*

## New Diagnostics Capability

- DFFITS: *Spot influential runs via this deletion diagnostic that measures difference in fits when any given response is removed from the dataset,*

- DFBETAS: *See from this deletion diagnostic how model terms change due to influential run,*
- (V7.03) Box-Cox transformation parameters added to diagnostics report: *Includes stats that may not appear on the plot.*

## Updated Graphics

- Grid lines on contour plots: *See more readily what the coordinates are at any given point,*
- Select the details printed on flags planted on contour plots: *As a user you now can control this feature.*
- Confidence bands on one-factor plots: *Get a good feel for the uncertainty in predicted response as a function of the factor level,*
- Color-codes for positive versus negative effects: *Assess plus or minus impacts on half-normal and Pareto plots.*
- Smart tic marks: *Get more-reasonably rounded settings straight off.*

## Improved User Interface

- Export graph to file: *Save as enhanced metafile (.emf) that can be inserted as a picture from file to Microsoft Word and the like,*
- Set row status to normal, ignore or highlight: *This allows users control over their design matrix,*
- Set single cell status to normal, ignore or highlight: *Even better!*
- Sort the design layout by any of six options by right-clicking in the upper left corner of the design layout screen: *Provides great flexibility on what you want displayed,*
- (V7.02) Sort by row status – normal, ignored or highlighted: *Most real-life experiments do not go as planned so it's good to easily assess the damage,*



- (V7.03) Tab flow through all fields on screen: *Quicker for data entry than having to click your mouse in a new location,*
- (V7.03) DX7 files can be saved in DX6 format: *The backward compatibility helps when dealing with users who choose not to upgrade or cannot afford to do so,*
- (V7.1) More flexibility in handling various file types when opening files: *Very helpful default that automatically recognizes any data in Design-Ease (.de\*) or Design-Expert (.dx\*) format – including ones produced from older versions,*
- (V7.1) From Design node, display mixture Constraints coded in actual, real, or pseudo values: *An important distinction for understanding the experimental region of formulation,*
- (V7.1) Keystroke option (Ctrl+/-) to move through alternate solutions from numerical optimization: *This saves mousing around.*

#### **More Options for Design Evaluation**

- Annotation option on reports: *This will be a boon to those who may be unfamiliar with all the esoteric statistics needed for design evaluation,*
- Customizable design evaluation content and power levels: *Use OPTIONS button to select which statistics to display, specific power levels to report, and whether to display the standard error or variance on graph (with option to scale by N – the number of runs in the design),*
- Specify model terms to ignore so they don't display in alias list: *For example, don't bother showing interactions of four or more factors,*
- Evaluation can be done on either design or a particular response: *Shows the effect when data is missing from a specific response, but not all responses.*

#### **Expanded Help**

- Tutorial movies: *See Flash demo's of features via the Screen Tips – a very effective way to show how to navigate through the software,*

- Internet links: *Helpful connections to further information.*

#### **New Import/Export Tools**

- View all supported file types in the “Open File” dialog box: *No more hassles when opening files from previous versions!*
- Save files created with this version (V7) in the format needed to be read by the previous one (V6): *Provides backward compatibility for those who fall behind on the upgrade path,*
- XML (eXtensible Markup Language) capability: *Export design file or reports in viewable format that can be manipulated for further processing (XML tool also allows import of designs created externally),*
- Scripting capability: *Run Design-Expert software in batch mode so it can be tied into more comprehensive lab-ware or to cycle through massive quantities of data, for example from computer-based simulations,*
- (V7.1) Import and export text files to get responses: *Something do-able by anybody,*
- (V7.1) Write transfer functions in format (.vta) readable by VarTran® software (Taylor Enterprises): *Sets the stage for statistical tolerancing and sensitivity analysis leading to more robust designs.*

## Credits

The following staff members of Stat-Ease deserve credit for production of Design-Expert software:

- Neal Vaughn (project leader),
- Tryg Helseth (VP Programming),
- Programmers: Hank Anderson, Brian Smith.

The brains behind the statistical aspects of the software are:

- Pat Whitcomb (Founding Principal),
- Gary Oehlert (advisor),
- Shari Kraber and Wayne Adams (help writers).

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- Mark Anderson.

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- Renee Keller,
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