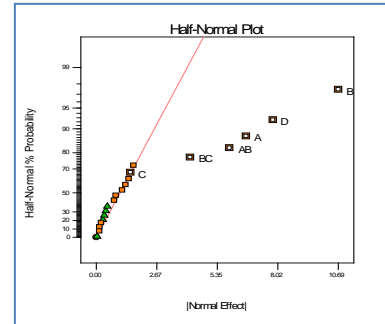


Features Available Only in Version 8 of Design-Expert® Software

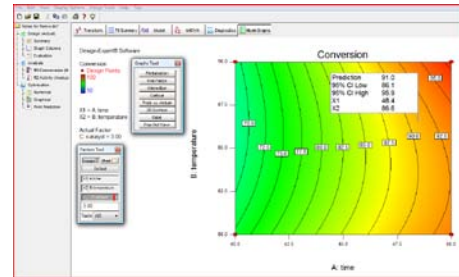
New graphics and improved interface

- Half-normal selection of important effects on all factorial designs*: *Simple and robust method for selecting important effects – formerly available only for two-level designs. For example, see this screen shot from an experiment on 5 woods, glued with 5 adhesives using 2 applicators with 4 clamps at 2 pressures. The vital effects become apparent at a glance!*

*(Detailed in “Graphical Selection of Effects in General Factorials” – winner of Shewell Award for best presentation at 2007 Fall Technical Conference co-sponsored by the American Society for Quality and the American Statistical Association.)

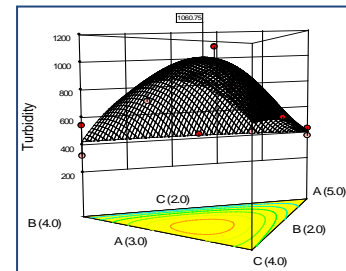


- Smoother color gradients on 2D contours: *More impressive for presentations to management, clients or colleagues.*
- Rounding of contour values: *More presentable defaults require less ‘fiddling’ for reporting purposes.*



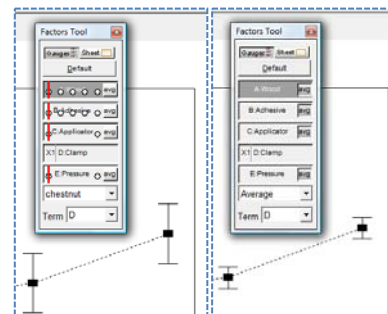
- Planted flags shown on 3D surfaces: *Previously user could only plant flags on the 2D contour plots. Here we see the flag planted by numerical optimization on turbidity of a detergent formulation via mixture design – a specialized application of response surface methods (RSM).*

- New fully-configurable option for reflecting smooth, lighted colors off your 3D surface*: *Dazzle your customers and colleagues while providing highly-informative graphics on how responses will react to process changes.* (Mesh can be turned off if you like)*

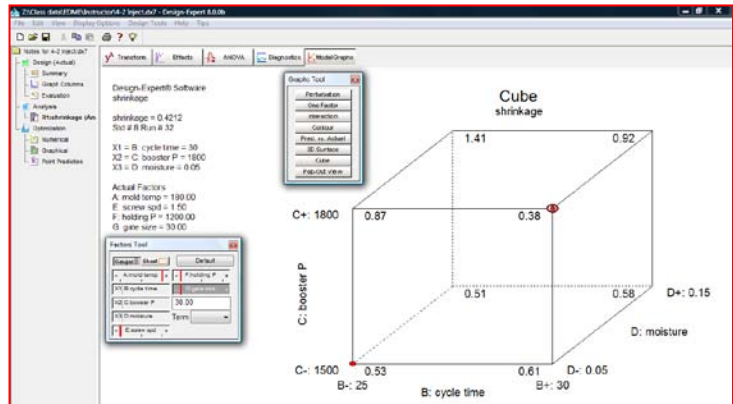


- Spin 3D graphs directly with your mouse: *When you see your cursor turn into a hand (☞), simply grab and rotate! Double-click the graph to go back to the starting angle.*

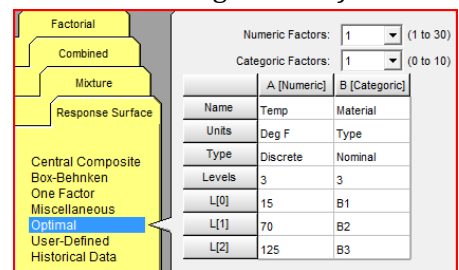
- Push-button averaging on the factors tool: *Makes it far easier to plot main effects and interactions more meaningfully. Previously the only option to average factors came via the hard-to-get-at down-list. In this series of two screen shots the user simply pressed the “Avg” for 5 woods, glued with 5 adhesives using 2 applicators at 2 pressures. This causes the least significant difference (LSD) bars to shrink, thus uncovering an important difference between two particular clamps.*



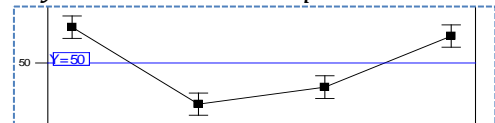
- Cube plot more interactive: *Click on design points to see factor levels and response prediction on the graph legend.*



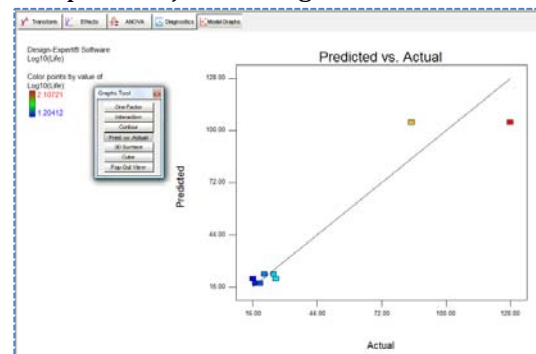
- Direct setting of discrete (fixed) numeric levels in response surface designs: *Limit factor settings to reasonable levels, but still produce continuous models. For example, in this case 3 battery types must be tested at 3 discrete temperatures. Previously this would have been possible but very tricky via a work-around. Now it's easy!*



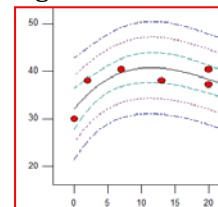
- Discrete factor levels adhered to in numeric optimization: *Find the most desirable setting for factors that are not continuous, such as the number of passes through a spray coater.*
- Enter input variables vertically (as shown above): *When entering many levels, this may be more convenient than the horizontal layout.*
- Reference lines on plots: *Horizontal, vertical, and free style-lines enhance the plot. Here it becomes completely clear that four clamps tested for a wood-adhesive application fall into two groups – good versus bad based on a cutoff of 50.*



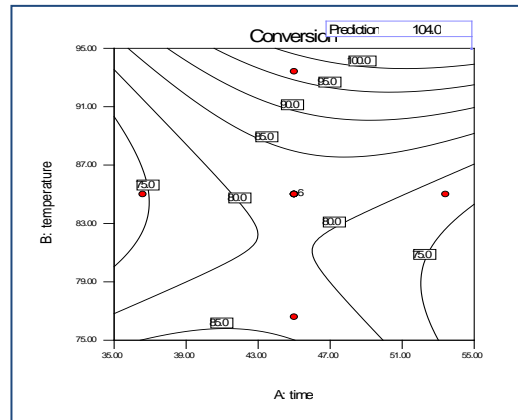
- Predicted vs. Actual graphs are available in Model Graphs, not just in Diagnostics: *This becomes useful when a response has been transformed because under Model Graphs one can change the view back to the more relevant original scale.*



- Confidence, prediction and tolerance intervals (CI, PI & TI) plotted with configurable colors on one-factor response plots: *Convey the uncertainty in prediction. In the screen shot shown at right, the actual run results are represented by red circles. The solid line is the predicted value based on the polynomial model. The bands are the CI (narrowest), PI and TI (widest).*

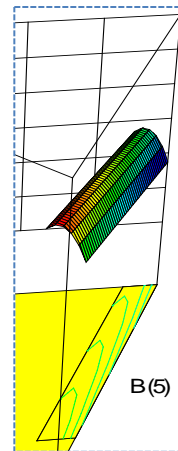


- Response surface graphs can be shaded in color to see where standard error increases: *This makes it easier to fathom where a predicted response will get you in deep water by extrapolating beyond the actual region of experimentation. In this example, a flag is set beyond the axial points of a central composite design and thus the prediction becomes meaningless.*



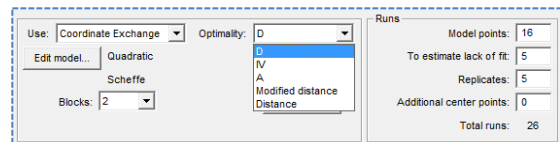
Better mixture design and modeling tools for improved predictive capability

- Partial quadratic mixture (PQM) analysis: *Model non-linear blending behavior most effectively. In the example pictured, an orange drink was formulated from artificial flavorings. The intensity of the primary taste, measured by a sensory panel, proved to be non-linear in a way that was modeled best by PQM.*
- Design for linear plus squared terms on mixture designs: *Save on number of blends required for optimal design for non-linear blending.*
- Design for special and full quartic mixture models: *Capture extremely non-linear relationships among the components.*
- Blocking expanded to simplex mixture designs: *Blend your cake and bake it in two oven batches, for example.*
- The trace plot offers an option to show the end points as actual values when you have a design built with U-pseudo coding: *The upper (“U”) bounded approach becomes advantageous for inverting regions in certain constrained mixture situations. However, due to the axis flipping, it is easy to misinterpret trends when viewing a trace plot without this new feature.*
- Increased limit on components for screening and historical* designs. *Design-Expert now handles up to 50 individual ingredients – up from 40 and 24; respectively.*
 *(Data collected at happenstance, for example by assaying retained samples from a period of material production.)

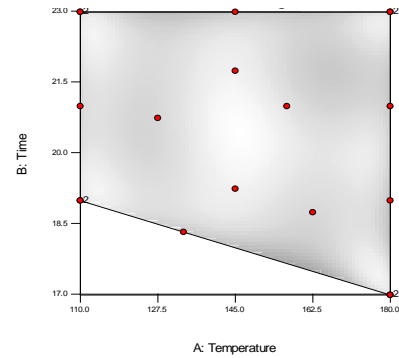


More choices for custom designing your experiment to just what you need

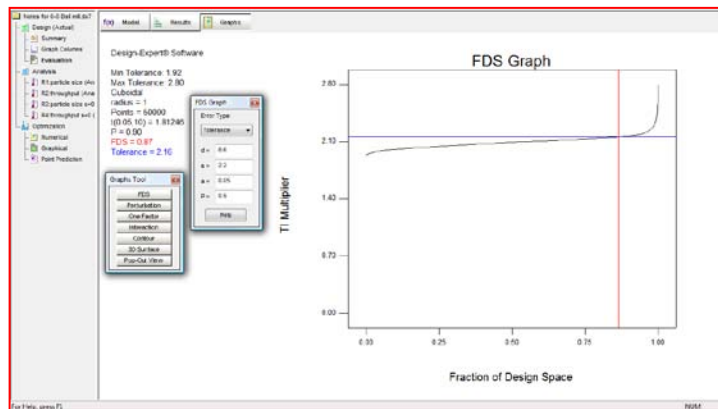
- D-, IV-, and A-optimal design selection: *New criterion for crafting experiments to model of choice within realistic constraints.*



- Constraints calculator: *Simplifies the process for calculating constraint inequalities. In this example a food scientist cooking up a starch must leave it in the pot longer at the low end of temperature. With guidance from program help, the lower left corner of the design space can be excluded by a multilinear constraint equation generated from a few user inputs. Then an optimal design is fitted to this region.*



- Tolerance-interval-based design sizing: *An enhancement to the fraction of design space (fds) plots for assessing whether your planned experiment is large enough, given the underlying variability (noise), to establish tolerances at the range you deem important.*

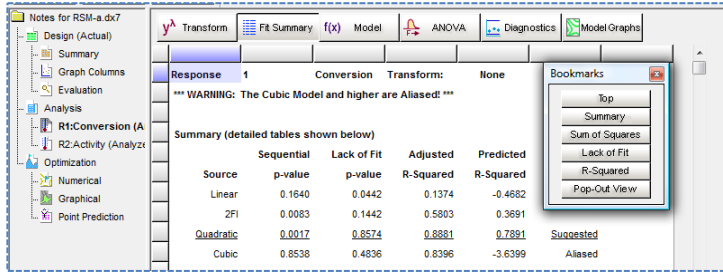


Additional statistics and more concise reporting of vital results

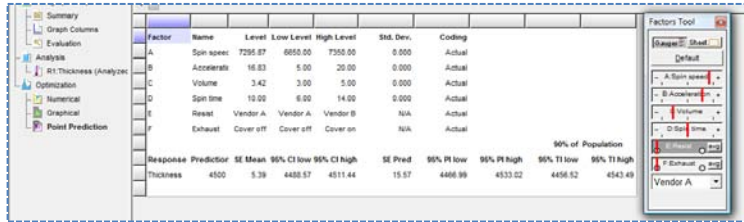
- Improved handling of curvature testing for factorials with center points: *All points in the design are now fitted to the polynomial model used for predictions, thus providing a more realistic impact of significant non-linear response behavior. Diagnostics can be done for the model adjusted for curvature or, via a view option, unadjusted. The model without a term for curvature (unadjusted) is used for model graph and point predictions.*
- Coefficients summary: *After modeling your response(s), see a concise table of coefficients color coded by their relative significance. In this case the second response is modeled only by main effects, two of which are significant at the $p < 0.1$ level.*

| Term | Response | Intercept | Block 1 | Block 2 | A | B | C | AB | AC | BC | A ² | B ² | C ² |
|------------|----------|-----------|----------|----------|---------|----------|---------|--------|---------|--------|----------------|----------------|----------------|
| Conversion | Blue | 81.6822 | -1.91975 | 1.91975 | 1.82845 | 4.04357 | 0.20396 | 2.125 | 11.375 | -3.375 | -1.88987 | 2.877 | -0.25472 |
| p | Green | | | | 0.3790 | 0.0054 | 0.0003 | 0.1774 | +0.0001 | 0.0257 | 0.1138 | 0.0261 | 0.0009 |
| Activity | Red | 60.2963 | 0.14375 | -0.14375 | 4.26058 | 0.254816 | 2.22997 | | | | | | |
| p | Green | | | | +0.0001 | 0.3525 | +0.0001 | | | | | | |

- Condensed “Fit Summary” table: *See the vital details on model choices before delving into all the particulars. Here you can see why the program recommends one model over the others (notice the superior R-squared values for quadratic in this case).*

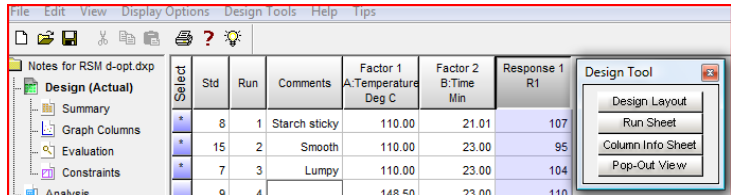


- Tolerance interval (TI) estimates on point prediction: *This becomes important for verification studies to ensure your process will stay within manufacturing specifications. For example, in this case the thickness must stay within 4400 to 4600 for the tolerance interval to provide assurance.*

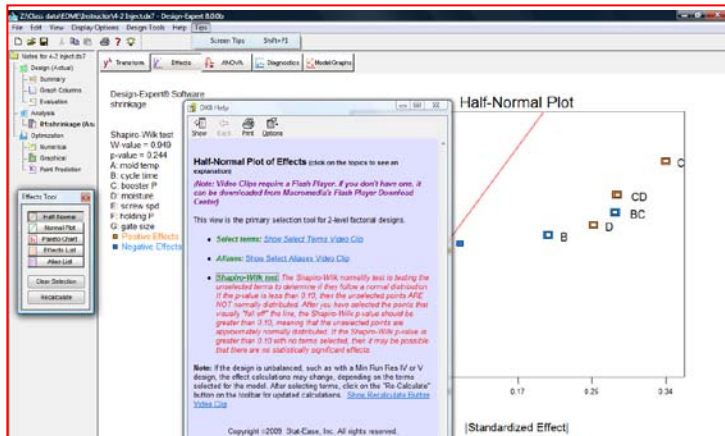


Increased visibility and versatility of tools and features

- Many highly-visible tools added: *Options previously only available via hidden View menu options can now be easily seen and taken advantage of. The Design Tool shown on the screen shot below is just one example.*
- Column widths in the design layout can now be adjusted automatically by double-clicking on a column-header boundary: *Multiple columns can be adjusted simultaneously!*
- Comments can be attached to rows by right-clicking on the row header: *A handy way to record important observations as shown here.*

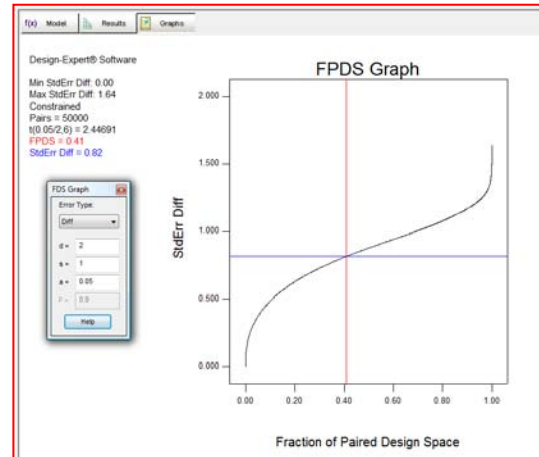


- Topic Help, Tutorials and Sample Files have been added the main Help menu: *Follow these alternate paths for getting timely program advice.*
- Screen Tips have their own item on the main menu (“Tips”): *Provides greater visibility of this extremely useful just-in-time advice.*



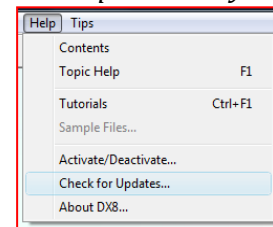
Enhanced design evaluation to more accurately assess the quality of your factor matrix

- Several new matrix measures are now provided: *Most notably the G-efficiency.* *(To put it simply, this criterion, expressed on a 0 to 100 percent scale – higher the better – leads to designs that generate more consistent variance of your predicted response. However, like any other single measure, it may not accurately reflect the overall effectiveness of a particular matrix. That's why Design-Expert provides an array of matrix statistics and graphics for overall design evaluation.)
- Fraction of paired design space (FPDS): *This innovative tool allows users to assess the power of RSM or mixture designs for detecting a specified signal (difference in response that's deemed important) in the presence of noise (system standard deviation). In this example pictured, less than half the design space will reveal the difference of interest. Ideally, this will exceed 80 percent, so in this case the experimenter should consider adding more runs to their design.*

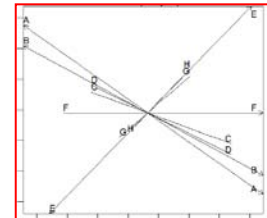


Many things made nicer, easier faster throughout the program

- One-click check for updates: *The program will check for timely maintenance patches so you no longer need to look for these via the Stat-Ease download web page.*



- Better defaults for contour levels and tick marks: *By starting out with more rounded values, V8 of Design-Expert sets you up to show off your results immediately without doing a lot of cosmetics via its Graph Preference features (a right-click menu).*
- Zoom in on graphs using your mouse wheel (right-click reset for original size): *Quickly drill down on regions of interest.*
- Press left mouse button to drag graph (right-click reset for original position): *A fast way to put the region of interest where you want it in the coordinate space. In the mixture trace plot at the right, components G and H are constrained to very tight ranges relative to the other ingredients, so they can hardly be seen without zooming first and then dragging the intersection (the overall centroid of the formulation space) to the middle.*

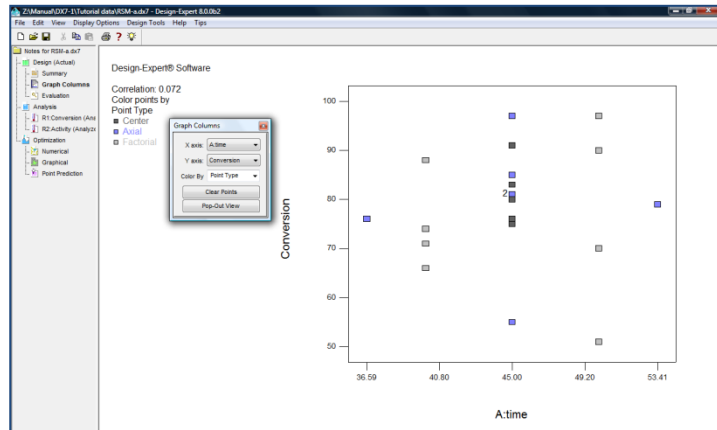


- Separate preference tabs for X-Y versus surface graphs: *DX8 delivers just what you need.*
- Reduced flicker in graph updates: *Much easier now to quickly re-draw responses at varying levels of input variables.*

- Categorical factors (established via a general factorial, for example) can now be converted to discrete numeric: *This paves the way to applying response surface methods while adhering to processes that are run most conveniently only at specific settings.*



- Color by point type added for graph columns: *Very useful addition to scatter-plots, such as this one for a central composite design (CCD).*



- Upgraded MFC (Microsoft Foundation Class) common controls: *This new application framework provides improved look and feel.*
- For XML: A new script command to list possible commands; capability to parse files with different extensions (other than .xml) and new import/export/reset preferences commands: *More utility for making use of Design-Expert programmatically.*