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Create Concise and Compelling DOE Reports: Tips and Tools

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Making the most of this learning opportunity

→ Hide the Control Panel
🎤 Mute your line

SE™

To prevent audio disruptions, all attendees will be muted.

Questions can be posted in the Question area, and I'll make every effort to address them during our brief one-hour webinar.

Questions may also be sent to stathelp@statease.com. Please provide your company name and, if you are using Design-Expert, the serial number (found under Help, About).

Note: The slides and a previous recording of this webinar is posted on the Webinars page of the Stat-Ease website for your review.

DOE Documentation: Webinar Purpose

- ➤ Know what belongs in a DOE report
  - ➤ Know what may be judiciously omitted
- ➤ Learn several methods to extract and edit DesignExpert / StatEase 360 content to use in standard reporting tools
- ➤ We will use only commonly available Microsoft® tools, with the assumption that the report will be created in Word or the presentation will be in PowerPoint
- ➤ We will not address specific report outlines which may differ between organizations

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Agenda

- ➤ Hints on what to include in a DOE report
- ➤ Transferring and editing DesignExpert / StatEase 360 content for reports
  - ➤ Table Content
  - ➤ Graphical Content
- ➤ Wrap Up

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Agenda

- **Hints on what to include in a DOE report**

- Transferring and editing DesignExpert / StatEase 360 content for reports

  - Table Content

  - Graphical Content

- Wrap Up

Hints on what to Include

- Our perspective is biased towards engineering reports which aim to drive home the key messages

- Best to avoid content that dilutes or distracts from the key points and discoveries

- Academic or research reports may require more elaborate content

- Your organization may have additional requirements

- The key is to find the best content to communicate your message to your audience!

Hints on what to Include

➢ Always include the raw data, generally in the appendix

➢ For standard designs (e.g., 2^k-p, PB, CCD, BBD, 3^k, simplex lattice) do so in standard order with a column showing the actual run sequence

➢ For **optimal designs**, include build type. Then sequentially sort by descending factor (e.g., C, B,A) then by build type. Include the run sequence column but omit standard order

➢ If the data table is too large, provide a durable way to preserve it for future reference

Hints on what to Include

➢ Report the model in reduced form, stating that all terms other than those needed for hierarchy achieved $p<0.05$, as does the overall model p value.

➢ Refrain from reporting the ANOVA table and Fit Statistics

➢ Do report adjusted and predicted R^squared values

➢ If a transform gets applied, report this and why so (e.g., Box-Cox).

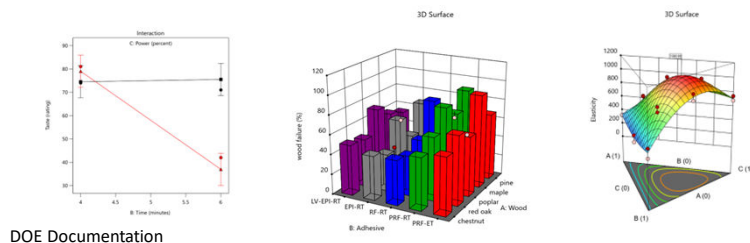➢ Do not include diagnostic plots but disclose any outliers and whether they got ignored or not.

Hints on what Graphics to Include

➢ Use the plot that best communicates your message.

➢ Generally, this will be ME (if not part of any 2FI's) and 2FI plots (if any) for factorial models.

➢ For multilevel categorical, try the 3D 'skyscraper' plot.

➢ For process and mixture optimization show 3D plots.

Hints on what Graphics to Include

➢ For any multiresponse DOE optimizations include:

  ▪ Ramps view

  ▪ Overlay plot

   • with CIs if design large enough to support these, i.e., these do not completely shade out the 'sweet spot'.

Agenda

➤ Hints on what to include in a DOE report

➤ **Transferring and editing DesignExpert / StatEase 360 content for reports**

   ➤ **Table Content**

   ➤ Graphical Content

➤ Wrap Up

Table Content (the data table)

Method 1 – Snipping tool (Microsoft®)

▪ *Things don't always need to be hard!*

Std	Run	Factor 1 A:Temperature deg C	Factor 2 B:Pressure psig	Factor 3 C:Concentration percent	Factor 4 D:Stir Rate rpm	Response 1 Filtration Rate gallons/hr
1	12	24	10	2	15	45
2	7	35	10	2	15	71
3	8	24	15	2	15	48
4	13	35	15	2	15	65
5	16	24	10	4	15	68
6	14	35	10	4	15	60
7	9	24	15	4	15	80
8	11	35	15	4	15	65
9	2	24	10	2	30	43
10	10	35	10	2	30	100
11	1	24	15	2	30	45
12	3	35	15	2	30	104
13	4	24	10	4	30	75
14	6	35	10	4	30	86
15	5	24	15	4	30	70
16	15	35	15	4	30	96

Table Content (the data table)

Method 2 – Export from DX into Excel

- In table, Copy with Headings into Excel

Std	Run	Factor 1 A:Temperature deg C	Factor 2 B:Pressure psig	Factor 3 C:Concentration percent	Factor 4 D:Stir Rate rpm	Response 1 Filtration Rate gallons/hr
1	12	24	10	2	15	45
2	7	35	10	2	15	71
3	8	24	15	2	15	48
4	13	35	15	2	15	65
5	16	24	10	4	15	68
6	14	35	10	4	15	60
7	9	24	15	4	15	80
8	11	35	15	4	15	65
9	2	24	10	2	30	43
10	10	35	10	2	30	100
11	1	24	15	2	30	45
12	3	35	15	2	30	104
13	4	24	10	4	30	75
14	6	35	10	4	30	86
15	5	24	15	4	30	70
16	15	35	15	4	30	96

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Table Content (the data table)

Method 2 – Export from DX into Excel

DEMO: Optimal Fish training exercise

- Data table cleanup in Design Expert
- Further cleanup in Excel
- Placement into Word

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Agenda

➢ Hints on what to include in a DOE report

➢ **Transferring and editing DesignExpert / StatEase 360 content for reports**

➢ Table Content

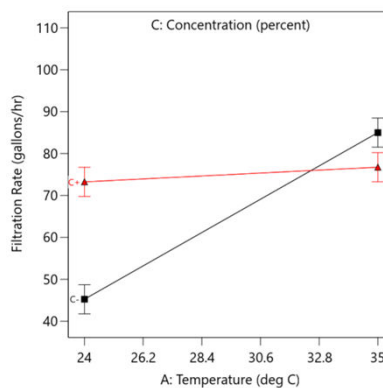 ➢ **Graphical Content**

➢ Wrap Up

Graphical Content

Method 1 – Snipping Tool (again)

Hints:

- Image can be scaled
- Text and font cannot be modified after capture
- DX preferences can be used to change fonts before capture
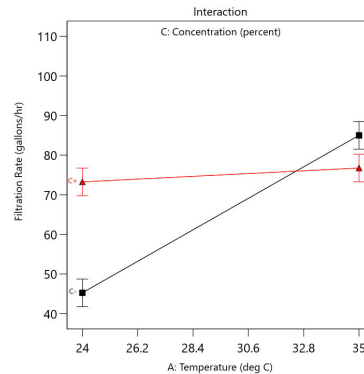- Note: preferences will be saved as the default unless set back to original

Graphical Content

Method 2a – export bitmap graphic directly from DX

Hints:

- Turn off Legend (View, show legend unchecked)
- Right-click image, export to…
- Export as bitmap allows the image to be resized
- Cannot edit text etc.

Graphical Content

Method 2b – export metafile graphic directly from DX

Hints:

- Turn off Legend (View, show legend unchecked)
- Right-click image, export to…
- Export as Enhanced Metafile
- Select image in PowerPoint and Ungroup
- √ Individual components can now be edited
- ***Note: it is best to edit in PowerPoint even if the final graphic will be in Word***
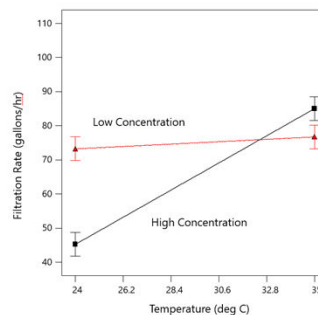

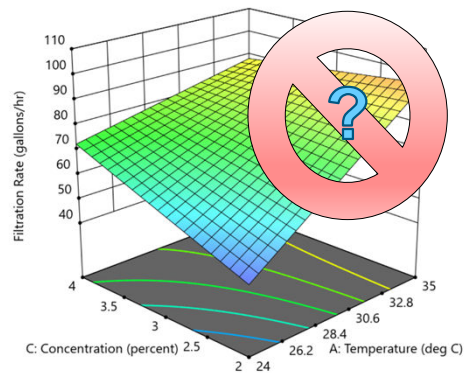Figure 1: Impact of Temperature on Filtration Rate at High and Low Formaldehyde Levels

Graphical Content

Method 2b – export metafile graphic directly from DX

Hints:

- You may encounter difficulties editing 3D and Contour plots using this technique
- Use of the techniques in the previous 2 slides are recommended
- Or, consider one last approach…

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Graphical Content

Method 3 – Using Microsoft® Photos and Designer

- Export graph to file (png type)
- Open file in Photos app
- Select Edit (upper left)
- Crop as desired
- Erase undesired features (text) using the eraser tool
- Adjust brightness / color as needed
  - Take highlights to 100% (or the image will have a grey background
  - Modify other sliders as desired
- Save the image (upper right)
- Edit in Designer
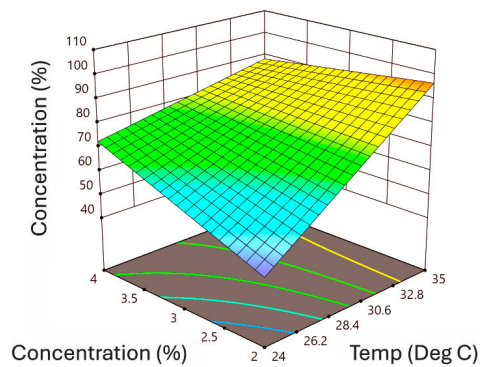 - Add text
- Copy Image (upper right)
- Paste in PowerPoint

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Graphical Content

Method 3 – Using Microsoft ® Photos and Designer

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Agenda

➢ Hints on what to include in a DOE report

➢ Transferring and editing DesignExpert / StatEase
360 content for reports

   ➢ Table Content

   ➢ Graphical Content

➢ **Wrap Up**

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Concise and Compelling DOE Reports

Wrap-Up

➤ Knowing what to report is critical

  ➤ The impact of your work depends on the story you tell

  ➤ Generally, it is best to keep the message simple

  ➤ Focus on impact

  ➤ Relegate detail to the appendix

  ➤ But you are the author and must decide what is relevant within the context of your organization or institution

Concise and Compelling DOE Reports

Wrap-Up

➤ DOE reporting requires extracting and editing content from Design Expert / StatEase 360

  ➤ Tables are best edited in Microsoft Excel

  ➤ Graphics content can be extracted through

    ➤ Snipping Tool

    ➤ Directly exporting graph

      ➤ Bitmap (scalable)

      ➤ Enhanced Metafile (more editable)
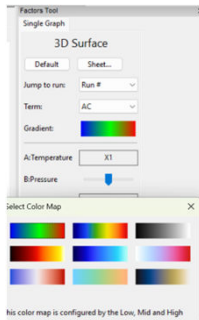
    ➤ Export to File, edit in Photos + Designer
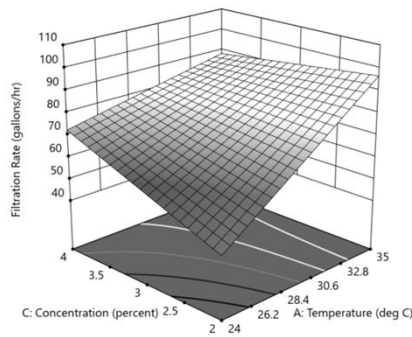
Concise and Compelling DOE Reports

Wrap-Up

➢ One last parting gift

➢ The color gradient can be more carefully managed in the 2025 release!

Stat-Ease Training:
Sharpen Up Your DOE Skills

Modern DOE for Process Optimization

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