Karl’s Rules for Designing a Great Poster

If you find yourself explaining your poster’s basic concept, or if people are avoiding you and your poster like the plague, then it’s not doing its job of being interesting, inviting and drawing people to it.

TEXT

Keep the simple and elegant:

• Don’t write too much! Be concise. Edit! This is a poster, not a manuscript. A lot of posters are too wordy and NO ONE wants to dive into something that looks like homework. Use visuals more. A rule is 2/3 visuals to 1/3 text. This will be more inviting. A block of text should be no more than about six sentences.
• Use phrases with bullet points when possible, rather than full sentences.
• Don’t use more than two different fonts. Personally, I would use only one san-serif font. A sans-serif font has none of the little tails on the letters, like the font “Helvetica”. A serif font, like “Times” or “Palatino”, has little tails. But it’s okay to use a sans-serif for the headlines and a serif for the smaller copy.
• Make your main headline large, short and to the point. It should be the first thing a person reads on your poster. Look at newspaper headlines for an example of a good size.
• Use a logical type hierarchy. Don’t use more than three or four type sizes in your poster. One will be your large headline and a second will be your smaller text. That leaves two more sizes. One could be for three or four larger “chapter headings” to separate the main sections of your poster and the fourth a sub-headline size to introduce the elements within each chapter.
• Keep your headlines and subheads short and to the point. Describe detail in the body copy, not headline.
• Use black or white text. Use color sparingly and with reason, like to organize. Don’t do it just to be fun and attention getting, wheeeeee. The attention you get won’t be good.
• Don’t outline your text with a line. Looks really cheesy.
• Don’t use gimmicks in your headline, like rainbow blends and shadows. Looks cheap and ugly.
• Don’t “squeeze” text to condense it. Reduce the point size or use a condensed font.
• Don’t mix a whole bunch of sizes, fonts, styles (bold, italic, regular, caps…) never underline text, and avoid italics, too. Yuk.
• Left-justify text; avoid centering and right-justifying text.
• Type should be large enough to be read from a short distance. SPARE the reader the work of squinting their face up to your poster to read tiny, dense, wordy textblocks. • Spacing between lines (called “leading”) in copy blocks should be point-size plus 1 1/2 points. So a 14 point type size would have a leading of 15.5, or +1.5 as some software programs do it.

DESIGN

Elegant, simple, open (white space, not dense), not wordy.

• Sketch out your idea on paper.
• Organize your information using a grid, a column format to make your poster easier to read. It doesn’t have to be a three-column poster, it might work better as a four or five column.
• Plan your poster like you’re telling a story, in a narrative form with a beginning, middle and end. Make it logical, with the most important information at top left and going down to the bottom. Many posters use photos of the team that did the project right at the top. Sorry, but that is the LEAST important fact about the project. Put them at the bottom, and make them small! Use your space to sell your idea.
• Have a dominant image that anchors your poster and grabs attention. It doesn’t have to be in a box. Better if it is cropped around the shape. A huge cutout of a robotic arm anchoring the poster will look cool.
• Mix up the sizes of images based on importance. A poster with everything the same, small size is boring and the eye doesn’t know where to start. Think of the poster as a symphony, with loud big drums mixed with small-sounding flutes. If everything’s the same size, squeezed perfectly inside their columns, it becomes gray and bland.
• Don’t pack everything in like a sausage! Edit your content to leave open areas of white space that give the reader a clear separation of sections as well as places to rest the eyes. Let it “breathe!”
• Don’t use fancy backgrounds like blends or whoosh lines or whatever on your poster. It’s cheesy, and it looks like you thought your information and design were boring so you decided to “entertain” the viewer.
• Use color sparingly. This isn’t a beachball. Grab attention with a dominant image, not with gross uses of color.
• Align things. If you have two photos side-by-side, make them the same size (crop if needed) and make sure their captions align.
• Boxes, boxes, boxes!! Yaaaaggh! Don’t put everything into a box. Your poster will look, well, really boxy. But if you do use a box with type in it, leave plenty of breathing room around the type so that it can breathe.
• Don’t use really fat lines! Thin is elegant.
• Don’t mix chart/graph/table styles. They should all match and live together. Replot handout graphics to conform to your poster style.
Acknowledgments

We would like to acknowledge the following people and recognize their contributions to our project:

- Steve Laguette: Project Coordinator
- Kirk Fields: Design Advisor
- Dr. Keith Kedward: Composites Advisor
- Dr. James Leslie: Composite Material Supplier
- Nelson Bednersh: Fabrication Advisor
- Andy Weinburg: Fabrication Advisor

This project aimed to create a highly fuel efficient vehicle to demonstrate a solution to the rising public concerns for environmental pollution, fuel prices, and the depletion of natural resources. By reducing the vehicle weight, rolling resistance, and aerodynamic drag, less strain will be placed on the motor leading to enhanced fuel economy.

DESIGN

NASA-Goddard Space Flight Center (GSFC) developed a rover with three-dimensional image scanning capabilities and requested that Team 2 further develop it with terrain mapping and compliance with competition requirements.

Benchmarking

NASA-Goddard Space Flight Center (GSFC) developed a rover with three-dimensional image scanning capabilities and requested that Team 2 further develop it with terrain mapping and compliance with competition requirements.

PERFORMANCE

NASA-Goddard Space Flight Center (GSFC) developed a rover with three-dimensional image scanning capabilities and requested that Team 2 further develop it with terrain mapping and compliance with competition requirements.

Table 1. Weight Reduction!

<table>
<thead>
<tr>
<th>Component</th>
<th>New (lbs)</th>
<th>Old (lbs)</th>
<th>Weight Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseboard</td>
<td>5.5</td>
<td>18.5</td>
<td>55%</td>
</tr>
<tr>
<td>Rear Wheel Supports</td>
<td>0.66</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Roll Bar</td>
<td>1.9</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>Wheels</td>
<td>6.4</td>
<td>10.8</td>
<td></td>
</tr>
<tr>
<td>Steering System</td>
<td>3.3</td>
<td>18.3</td>
<td></td>
</tr>
<tr>
<td>Motor</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Sprocket</td>
<td>1.8</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>7.1</td>
<td>19.8</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>51.66</td>
<td>114.8</td>
<td>55%</td>
</tr>
</tbody>
</table>

55% Weight Reduction!

SuperMileage

Abstract: NASA-Goddard Space Flight Center (GSFC) developed a rover with three-dimensional image scanning capabilities and requested that Team 2 further develop it with terrain mapping and compliance with competition requirements.

TESTING

Test and Analysis NASA-Goddard Space Flight Center (GSFC) developed a rover with three-dimensional image scanning capabilities and requested that Team 2 further develop it with terrain mapping and compliance with competition requirements.

Figure 2. CAD model of final vehicle design.

Figure 3. FEA design validation of load bearing components.

Figure 4. Final vehicle assembly of optimized components.

Figure 5. Physical validation of competition requirements.

Figure 6. Prototyped model of aerodynamic fairing.

Figure 7. SAE 2007 Supermileage vehicle.

Figure 8. Aerodynamic fairing design.

Identify areas for improvement:

- Weight of existing vehicle components
- Driver orientation & ease of entry/exit
- Wheel size & rolling efficiency
- Frontal area & overall aerodynamics

Every component of the vehicle was designed, prototyped, optimized, and fabricated to meet the design objectives.

Compliance with competition requirements:

A) 20° roll stability
B) 50' turning radius
C) 250lb roll bar load capacity

Rolling Resistance:

- 55% relative reduction achieved by:
  - High performance racing hubs
  - 27% reduction in wheel dia. & increased tire pressure which causes a smaller contact area

Design Process:

- Review 2007 SAE competition rules
- Four vehicle configurations were considered & analyzed in a decision matrix
- All internal components were optimized for aerodynamics, weight, size, & strength
- Design aerodynamic fairing

Aerodynamic Enhancements:

- Frontal area reduced by 42.5%
- Maximum cross sectional area reduced by 40%
- Full body fairing designed and implemented

Identify areas for improvement:

- Weight of existing vehicle components
- Driver orientation & ease of entry/exit
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- Frontal area & overall aerodynamics

The iterative design process included:

- Hand calculations
- MATLAB optimization
- SolidWorks modeling
- FEA analysis

Figure 1. 2006 Supermileage vehicle.

Figure 5. Physical validation of competition requirements.

Figure 6. Prototype/mold of aerodynamic fairing.

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