ME 213 S2023:
Introduction to Engineering Design

Lecture 11:
• (1) DMM Tips
• (2) Oral Communications
• (3) Writing Communications
(1) DMM Tips
1. General Tips

Questions for Your Own Selection Process

1. Does everyone understand each concept to be considered?

2. Will you use a benchmark (datum), or relative scoring only?

3. What scoring scale will you use? How many values will it have? (1-10 is preferable)

4. Did you remember to include an objective/requirement for feasibility or manufacturability, Cost, Weight, etc.?

Note: As mentioned in the assignment, you are expected to organize your DMM & scoring by subsystem, not complete systems. You will then try to combine the “winning” ideas into a complete system solution.
2. General Tips

• **Coarse Screening: Why Does Something Fail?**
  Don’t just disregard something because it can’t meet a given spec. Is there any minor change you could make that would correct the problem? Can you combine one or more “almost successful” ideas?

• **Fine Screening: More Possible Score Values Are Better**
  The more “Objectives” you have at your disposal, the easier it will be to distinguish your concepts from each other.

• **Use Multiple Rounds of Scoring**
  Especially important if multiple concepts have the same or very similar scores.

• **Use of Units for “Parameter”**
  The more units (e.g., grams, $, hrs) you have for the “Parameters”, the easier it will be to distinguish your concepts from each other.

• **Still Not Satisfied? Brainstorm Again!**
  Bad scores don’t necessarily mean your system is too coarse or harsh. Go back and reassess.

• **Finally, Does the Winning Idea Make Sense?**
  You’ll prove things with your analysis later, but layout a solid conceptual framework for why your chosen concept is a viable solution. Does your logic stand up?
3. Why This Process Can Be Difficult

- Inherent difficulty of comparing very different concepts to meet wide variety of project requirements.

- **Biases** can tinge our objectivity, including:
  
  **Self-Preservation Bias:**
  Connecting sense of self-worth to opinion of *your ideas* (*i.e.*, “taking it personally”)

  **Belief Bias:**
  Evaluation of the logical strength of an argument is biased by personal belief in the truth or falsehood of the conclusion.

  **Overconfidence Bias:**
  Someone's subjective *confidence* in their judgments is reliably greater than their objective *accuracy*, especially when confidence is relatively high.

  **Example:** In some quizzes, people rate their answers as "99% certain" but are wrong > 40% of the time.
4. Get Started

• Plan a selection system with your team.

• Create your spreadsheets.

• Present your concepts to each other.

• As a group, score each subsystem concept.
Where are we going? / Next Steps

Expanding and refining design once goal / effort are approved (Tuesday)

Basic prototyping

Final “initial design” to start building with components
(2) Oral Communications
ME 213/481/482 PRESENTATION GUIDELINES (DR. NEJHAD)

10 RULES OF PRESENTATIONS

• 1) Organize your presentation in a logical manner (give Needs, Objectives, Big Picture of Design with Subsystems identified, Methodology, Subsystems, DMMs, Analyses, Manufacturing, Assembly, Testing, and Modifications)
• 2) Let everybody in your group speak
• 3) Integrate your presentation with your visual aids
• 4) Include all necessary details and eliminate all unnecessary ones
• 5) Use good quality slides only
• 6) Use plots, figures, and tables related to your design
• 7) Use slides from the prototype during and after manufacturing
• 8) Use text-slides where necessary (do not use crowded slides; 6/8 x 6/8)
• 9) Present your slides as clearly as possible
• 10) Rehearse your presentation until it is "letter-perfect," at least 3 times.
ME 213/481/482 PRESENTATION GUIDELINES (DR. NEJHAD)

10 ITEMS SAMPLE FORMAT

1) **Title** (Group members, ME 213/481/482, Fall 2022/Spring 2023, Instructor: Dr. Mehrdad Nejhad, Dept. of Mechanical Engineering, UHM)

2) **Presentation Outline** (Bulleted: Objectives/Backgrounds, Functional Requirements, Design, DMMs, Analysis, Manufacturing, Assembly, Testing, and Modification)

3) **Objectives, Motivations (needs), Background, Functional Requirements**

4) **Design Model** (Big Picture of Design with subsystems identified; use SolidWorks/U-Shape/Solid Modeling assembly drawing, etc.)

5) **Results of Design** (DMMs for at least 3 alternatives) and Analysis (Numerical/FEA and/or Analytical)

6) **Prototyping**, Manufacturing, Assembly, Testing, and Modification followed by: **Final Design Hardware**

7) **Budgets & Gantt Chart**

8) **Contributions**: You should CLEARLY state your CONTRIBUTION(S) also include strong and weak points of your design

9) **Conclusions & Future Recommendations**

10) **Acknowledgements**: (Sponsors: xxxx, and anyone who helped!)
(3) Writing Communications
Overall Quality: Poor

(1) Casual language
(2) Multiple authors (in terms of voice)
(3) Inconsistent analysis
(4) Lack of methodical approach
(5) Carelessness in vocabulary
(6) Formatting!!
Write Formally

<table>
<thead>
<tr>
<th>Informal</th>
<th>→</th>
<th>Formal</th>
</tr>
</thead>
<tbody>
<tr>
<td>a lot of</td>
<td>→</td>
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<tr>
<td>vs.</td>
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</tbody>
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Technical Writing

This is everything you as an engineer will produce.

Every EMAIL
Every LETTER
Every MEMO
Every REPORT
Every Lab Notebook
EVERYTHING
Aloha Airlines Flight 243
April 28, 1988
The subsequent investigation revealed that the 19 year old Boeing 737 had accumulated 35,496 flight hours prior to the accident, those hours included over 89,680 flight cycles (takeoffs and landings), owing to its use on short flights. This amounted to more than twice the number of cycles it was designed for. Fatigue cracking around the rivets was also discovered. The aircraft was basically an accident waiting to happen.
Executive Summary

On April 28, 1988, at 1346, a Boeing 737-200, N73711, operated by Aloha Airlines Inc., as flight 243, experienced an explosive decompression and structural failure at 24,000 feet, while en route from Hilo, to Honolulu, Hawaii. Approximately 18 feet from the cabin skin and structure aft of the cabin entrance door and above the passenger floorline separated from the airplane during flight. There were 89 passengers and 6 crewmembers on board. One flight attendant was swept overboard during the decompression and is presumed to have been fatally injured; 7 passengers and 1 flight attendant received serious injuries. The flight crew performed an emergency descent and landing at Kahului Airport on the Island of Maui.

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the Aloha Airlines maintenance program to detect the presence of significant disbonding and fatigue damage which ultimately led to failure of the lap joint at S-10L and the separation of the fuselage upper lobe. Contributing to the accident were the failure of Aloha Airlines management to supervise properly its maintenance force; the failure of the FAA to evaluate properly the Aloha Airlines maintenance program and to assess the airline’s inspection and quality control deficiencies; the failure of the FAA to require Airworthiness Directive 87-21-08 inspection of all the lap joints proposed by Boeing Alert Service Bulletin SB 737-53A1039; and the lack of a complete terminating action (neither generated by Boeing nor required by the FAA) after the discovery of early production difficulties in the B-737 cold bond lap joint which resulted in low bond durability, corrosion, and premature fatigue cracking.

The safety issues raised in this report include:

· The quality of air carrier maintenance programs and the FAA surveillance of those programs.

· The engineering design, certification, and continuing airworthiness of the B-737 with particular emphasis on multiple site fatigue cracking of the fuselage lap joints.

· The human factors aspects of air carrier maintenance and inspection for the continuing airworthiness of transport category airplanes, to include repair procedures and the training, certification and qualification of mechanics and inspectors.

Recommendations concerning these issues were addressed to the Federal Aviation Administration, Aloha Airlines, and the Air Transport Association.
Success in Technical Writing

1. Keep working on your writing.
2. Write first draft quickly, spend all of your remaining time editing.
3. Active voice (not passive)
4. Third person (avoid we)
5. No qualifiers “my opinion.” The document is your opinion.
6. Keep to facts, if a recommendation is made, support it.
7. **UNIFIED VOICE**
Two Versions of F. Scott Fitzgerald’s “Babylon Revisited”: A Textual and Bibliographical Study

By William White

Before F. Scott Fitzgerald's “Babylon Revisited” was included in *Taps at Reveille* (New York: Charles Scribner's Sons, 1935), pp. 382-407, the text generally used by critics and anthologists, this fine short story was considerably revised from its original appearance in *The Saturday Evening Post* ccix (21 Feb. 1931), 3-5, 82-84. As it is regarded as one of the best pieces of short fiction by Fitzgerald, if not one of the outstanding stories of the period in American literature, a full account of its bibliographical history and a comparison of the two versions may be worthwhile.
As we can see, in making his revisions of "Babylon Revisited," Fitzgerald made both minor and major changes: "traveled" for the original "traveled," or "ill health" for "ill-health," or "would see" for "could see," which are not of much importance. Other slight changes give a different and improved flavor to the story, such as "strictest queen's" for "effeminate young men," and "an unwelcome encounter" for "an unpleasant encounter," and his reference to "the maid," which is given a Parisian quality by "la bonne de toute facon" (an error for bonne à tous faire). The basic story, of course, did not change at all, but it was considerably sharpened and every word was made to count more. For example, the long passage in The Saturday Evening Post, p. 4, col. 2, lines 25-32, beginning:

Parents expected genius, or at least brilliance, and both the forcing of children and the fear of forcing them, the fear of warping natural abilities, were poor substitutes for that long, careful watchfulness, that checking and balancing and reckoning of accounts, the end of which was that there should be no slipping below a certain level of duty and integrity.

This may have been how Charlie Wales felt about Honoria—or Fitzgerald about his own daughter Scotty—but such a passage and the sentence immediately following simply hold up the story, and the author did well to eliminate it entirely. Another long passage, which Fitzgerald cut out as unnecessary, occurs in the Peters apartment (Post, p. 84, col. 2, lines 12-25), dialogue between Lincoln and Duncan: it adds little to the story and holds up the action. Other distinct improvements are the deletion of Marion Peters' remark, "If you behave yourself in the future I won't have any criticism" (Post, p. 84, col. 1, l. 28-29), which she would not have made to Charlie; and the method of Lorraine and Duncan finding out the Peters address, far better handled in the Taps at Reveille version.

On the other hand, when Fitzgerald added to his original account the long description of "the blue hour" in Paris (Taps at Reveille, p. 384), the façade, the cab horns, Brentano's store front, Duval's, and the Left Bank, he sets up a mood that not only tells us how Charlie
POWER

• P – Plan the writing
• O – Outline the Report
• W – Write
• E – Edit
• R – Rewrite
Effective Communication Basis

Effective communication demands what is written or said to be:

- Direct
- Accurate
- Clear
- Simple
- Without ambiguity*

*Without ambiguity

If you can’t explain it simply, you don’t understand it well enough.

– Albert Einstein

https://www.exkalibur.com
ME 213/481/482 REPORTS GENERAL GUIDELINES (DR. NEJHAD)

13 ITEMS SAMPLE FORMAT

1) **Title** (Group members, ME 213/481/482, Fall 2022/Spring 2023, Instructor: Dr. Mehrdad Nejhad, Dept. of Mechanical Engineering, UHM)

2) **Report Outline** (Bulleted: Objectives/Backgrounds, Functional Requirements, Design, DMMs, Analysis, Manufacturing, Assembly, Testing, and Modification)

3) **Contributors & Percentages**: Include the names of the Contributors and their Percentages for each Section.

4) **Refer to Figures, Tables, Appendices, and References** (in the text of your report)

5) **Objectives, Motivations (needs), Background, Functional Requirements**

6) **Design Model** (Big Picture of Design with subsystems identified; use SolidWorks/U-Shape/Solid Modeling assembly drawing, etc.)

7) **Results of Design** (DMMs for at least 3 alternatives) and Analysis (Numerical/FEA and/or Analytical)

8) **Prototyping**, Manufacturing, Assembly, Testing, and Modification followed by: **Final Design Hardware**

9) **Budgets & Gantt Chart**

10) **Contributions**: You should CLEARLY state your CONTRIBUTION(S) also include strong and weak points of your design

11) **Conclusions & Future Recommendations**

12) **Acknowledgements**: (Sponsors: xxxx, and anyone who helped!)

13) **References & Appendices**