ME213: Introduction to Engineering Design
Spring 2024
Group Assignment #3: Preliminary Design Report (PDR)
Due: Thursday, February 29, End of Class

Directions
Generate a Preliminary Design Report (PDR). Utilize the work you have been doing on your solution implementation and detailed design and create a formal report. Submit your report in PDF format via Laulima: Naming Convention: me213_2024s_teamName_pdr.pdf

Fix any issues and address any comments from your previous reports and add Part 3 to the report you are building up with the sections defined below. Use the same formatting and general tips as the previous reports. Add the appendices after the bibliography; each new appendix should start on a new page. Start Part 3 on a separate page. (Title Page, Table of Contents, Part 1, Part 2, Part 3, Bibliography, Appendix A, Appendix B). Figure and Table captions should be continuous. I.e. Either use a section naming convention Figure 1.1, 1.2, 1.3, 2.1, 2.2, etc or single numbering Figure 1, 2, 3, etc. where the first figure in this section starts as the next number of the figure in the last section.
Part 3: Engineering Analysis & Preliminary Design

Include an introductory paragraph for this section explaining the section’s contents.

3.1 Proposed Concept

In the context of, and utilizing the work from the previous section, identify the concept you have selected. Explain in words and figures why your selected concept is the best.

3.2 Engineering Analysis

Explain and justify your models that calculate the global “budgets” (mass, forces/torques, power, etc.) Include the governing equations behind the model. Describe the meaning (including units) if each variable in your system, including any factor of safety. Include numerical quantities and clearly mark your results.

Note #1: Make effective use of figures

Note #2: Step-by-step numerical calculations are not required. Just show complete equation inputs and then results. Any required details should go in an Appendix. (Appendix C probably)

Note #3: Just as with anywhere else in these report assignments, if you rely on any outside sources for information on your calculations or variables (e.g., equations, variable values), you must cite them properly.

3.3 Preliminary Subsystem Designs

Create an entry for each subsystem as below:

Subsystem Title
Briefly restate the objectives for the subsystem (i.e. remember to do iterative design loops – define, generate, implement, test), and provide a short physical description with all key components (include specific models/manufacturers for purchased products). Include a detailed image/drawing of the subsystem. Make note of any new or updated requirements that you have found based on your preliminary design and analysis with the other subsystems (e.g., mass target, power draw/generation, cost). Include a preliminary manufacturing plan.

3.3 Preliminary Manufacturing, Assembly, and Testing Plans

Bibliography

Add new citations to your text and bibliography as necessary.

[This section will always remain at the end of your report but before any appendicies. You should list proper citations, use IEEE format, for each externally referenced material (literature source, benchmark, etc.) in the order that you used them. For example:
[1] Citation 1 Information…

[2] Citation 2 Information…

You will be updating this section as well any time you add new references for this report.
Appendix A: Initial Bill of Materials (BOM)
Create a formal “report quality” version of your buy list. Create a table with your desired items for each vendor, as shown below. After you complete this assignment, you will submit your BOM tables as spreadsheets to the ME department for purchase.

<table>
<thead>
<tr>
<th>Vendor X</th>
<th>Item Name</th>
<th>Vendor Description</th>
<th>URL</th>
<th>Quantity</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxxx</td>
<td>xxxxxx</td>
<td>xxxxxx</td>
<td>xxx</td>
<td>xx</td>
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</table>

Subtotal: xx

Shipping: xx

Total: xx

Est. Shipping Time: xxx

Note #1: Don’t forget commonly-overlooked items, such as fasteners (nuts, bolts, washers, etc.), mounting brackets, and electrical wire.
Appendix B: Current Work Period Project Management

Describe your team’s project management strategy moving forward. Include details about how you decided to divide up your labor, such as whether or not you portioned out work based on subsystem or discipline/specialty. Explain why you chose to organize your work the way you did. Describe any unexpected challenges you encountered that may have required revision to your plan along the way (e.g., new discoveries that caused major design revisions and unexpected work). Finally, describe any changes that you may make in your work distribution in the future (e.g., moving electronics design work from one person to another who may have more time or experience).

Create a Gantt chart similar to the one shown below for each teammate, detailing all design work performed for this portion of the project. **Be very specific** in describing the individual tasks performed by each person, and **be honest** in how much time you actually spent. Your goal here is to show that effort was distributed both logically and equitably amongst the team.

<table>
<thead>
<tr>
<th>Team Member X</th>
<th>Wed (9/19)</th>
<th>Thurs (9/20)</th>
<th>Fri (9/21)</th>
<th>Sat (9/22)</th>
<th>Sat (9/29)</th>
<th>Sun (9/30)</th>
<th>Mon (10/1)</th>
<th>Tues (10/2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Research</td>
<td>1 hr</td>
<td>1 hr</td>
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<tr>
<td>CAD Modeling</td>
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<td>1 hr</td>
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<td>Report Writing</td>
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<td>0.5 hr</td>
<td>0.5 hr</td>
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<tr>
<td>Total Hours</td>
<td>9</td>
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**Note #1:** A large number of hours does not automatically translate into a better grade. Rather create a realistic and effective schedule.

**Note #2:** Review these Gantt charts with your teammates for potential clues about how to distribute work more evenly/logically in the future. Was someone able to complete their chosen assignment, but only after spending an inordinate amount of time on it? Might that person be better allocated to a different area of the project?
Appendix C: Detailed Calculations
This appendix is optional. It is only included if necessary.