Preliminary Design Review (PDR) Grading Rubric

**Bullet Symbol Key:**
- Graded
- Grading Criteria Defined Below
- Explanation/Notes

- **Title Slide**
  - Project members and respective division assignments
  - “Wow factor” image

- **Program Objectives & Mission Profile**
  - **Requirements and Verification**
    * Keep in mind: Correct Format? In the language of a requirement (shall, will, should)? Quantitative, verifiable, and realizable? Meets customer expectations?*
    - Program/Project (Level 1 Requirements)
      - Including verification concept
    - System/Subsystem Design (Level 2 Requirements)
      - Includes Custom PCB Level 2 Requirements
      - Including verification concept

- **Design Innovation**
  - Provide creative and/or innovative solutions to problems
  - Solutions make sense

- **System Design**
  * Keep in mind: Are the systems well-defined? Does this move the design process forward?*
  - **Product Breakdown Structure**
    - In the correct format
    - No missing links
    - Not a work-breakdown structure
    - Moves the design process forward
  - **Software Design**
    - Included programming flow charts
      - Programs make sense
      - Moves the design process forward
    - Separate slide shows future title block for each software module (e.g. subroutine).
      - Name and short description.
      - Shows inputs and outputs

- **Electronic System Design**
  - **System Block Diagram(s)**
    - Clearly delineates custom PCB
    - Included wiring diagrams
    - Detailed and Well-developed
  - **Interface Definitions**
    - Interface Matrix defined the electronic subsystems to be connected including interface to custom PCB

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1 Updated 10/5/2016 12:49 am, 2/28/2017 11:05 am, 3/13/2017 7:31 pm
2 An alternative to Visio is Draw.io
• Detailed and Well-developed

☐ Mechanical System Design
  • Typically a 3D exploded view of the product
  • Meets requirements and moves the design process forward

➤ Subsystem Task Descriptions

☐ Electronics and Control
  • Tasks associated with your Job Description
  • Breakout of Design Process and Modeling planned and completed (if any) tasks. These tasks must be quantitative and progress the design.
  • Each member is working on the correct item

☐ Manufacturing
  • Tasks associated with your Job Description
  • Breakout of Design Process and Modeling planned and completed (if any) tasks.
  • Each member is working on the correct item

➤ Project Status
  Keep in mind: 7 weeks have passed, have they made significant progress?

☐ Work Breakdown Structure
  • Correct format
  • Jobs follow Job Descriptions
  • Not Product Breakdown

➤ Project Schedule
  Keep in mind: … have a schedule? Correct format? Dates seem reasonable? Are they on task so far? Details?

☐ Top Level Schedule
  • Show top level with critical path
    ☐ Broken down by division
    ☐ Related to requirements
  • In a separate more detailed schedule show critical path items

☐ System/Subsystem Level Tasks
  • Consistent with Subsystem Task Descriptions
  • Have a schedule
  • Tasks are assigned to correct divisions
  • Follows WBS

☐ Burn Down and Project Percent Completion
  • Have a burndown
  • Has relation to their Project Schedule

➤ Resource Allocations

☐ Mass Allocations
  • Units are correct/consistent (i.e. grams, kilograms, etc.)
  • Reasonable and able to discuss the decisions/speculation
  • Source of expected value

☐ Power Allocations
  • Units are correct (i.e. current → mA, power → watts, etc.)
  • Reasonable and able to discuss the decisions/speculation
  • Source of expected value (Datasheet, Experiment, Measured, …)

☐ Other
• Anything else that needs allocating. For 3DoT projects this includes 3D Print Time.

Project Budget
• Is the budget in USD?
• Do you think Dr. Yeh will approve of this spending?

Project Report Checklist

By Amber Scardina, F’17 President

Here are some things to remember when editing your cost report, schedule, and burndown:
• Top Level Schedule must show critical path
• Top Level and Subsystem schedule must be unique to your individual project
• Cost must include the approved budget and any purchased goods must be updated. (I want to know how much has been spent currently on each project)
• Please label your axis on your burndown
• Show a vertical line on the burndown where your project is currently.
Design Process and Modeling

1. **Draw a preliminary sketch of the design:** Sketches of the model from the requirements and customer wants.

2. **Make a back of the envelope calculation:** Calculations for mass, support requirements, measurements etc to get an idea how to fulfill the requirements and customer wants.

3. **Conduct a trade-off study:** Studies of materials and parts that will be used. Studies like material properties, dimensions, specifications, how they relate to higher level requirements and moved the design process forward. Used calculations and quantifiable evidence to support their claims.

4. **Model the System:** Representation of the entire system. Includes 3D models, mass reports, System block diagrams, etc. Shows how the system is implementing requirement and meets requirements.

5. **Mathematical Model:** Representation of the system using formulas: torque, velocity and friction, power consumption, transfer functions, etc. Showed how they proved/disproved a problem. Modeled the system correctly: eg. the numbers and solutions makes engineering sense.

6. **Computer Simulation:** 3D simulation of the project in CAD showing movement, and demonstrating the above models like the mathematical models to be correct or incorrect depending on findings here. Proves project can meet requirements or determined problems for the project meeting requirements.

7. **Full-scale Prototypes:** Mock-up to demonstrate the 3D modeling and notice inconsistencies. Shows how the prototype meets requirements or has problems with requirements.

8. **Scale Model:** A smaller prototype mathematically scaled used in research for requirement completion. Scaling was correct, identified problems.

Notes

Keep in mind

- How does the following processes they presented complete a higher level requirement?
- Were they quantifiable?
- Were they complete in using the engineering method?
- Were they correct in their engineering words of choice?
- Was the model/study of good engineering quality? (eg, data, graphs, analytical studies)
- Did they identify, or have a solution to the problems relating to their higher level requirements?

Presentation

- Did they make a well-developed power point?
- Did they talk to the audience?
- Where they clear in their wording and speech?
- Did they present in a professional manner?