PHASE 5 ~ QUALIFICATION
Deliverable 27 ~ Final Design Presentation & Report

Due Date: http://rrg.utk.edu/resources/BME469/assignments.html#Deliverable27

INSTRUCTIONS. Present your final design qualification and year-long project results to the stakeholders and instructors; in addition, write a final design report about the design process and product development. Your presentation slides and written report are due electronically to Dr. Jeff Reinbolt (reinbolt@utk.edu).

Purpose

The final design report and presentation describes the entire design process and the end result, a developed product ready for adoption and marketable. An effective final design report and presentation decisively convinces the audience that the design product meets stakeholders' needs and makes business sense.

Critical Information

Because the final design report and presentation is foremost a decision package for the designed product's adoption and continuation to mass production, it must effectively *convey the credibility and value of the product* to all stakeholders. The thoroughness and appearance of this deliverable affect its credibility with the audience (stakeholders, instructors, prospective investors, or other decision makers). The written report includes vital supplemental information not included in an oral report due to limited time or interests or background of the audience. Write as concisely as you can while conveying the necessary information.

A final design *solution should be defended by explaining key features* of the design and their relationships to stakeholder needs and societal expectations, methods used, intermediate results obtained, additional resources required, and evidence for a product adoption that will have value to potential users and investors.

The quality of the final design deliverable will make a statement about the design team's professional competence, its attention to detail, and the credibility of the product the team has designed.

If you appear not to understand the engineering principles of your work, have left out important tests, or try to cover lack of effort with a "sales pitch," your final design will not impress the stakeholders and instructors.

Oral Presentation

The *design team is responsible for scheduling the presentation room, inviting and ensuring attendance of participants, and presenting the interim design*.

- SCHEDULING
  - The presentation must be scheduled and completed *before the written report due date* to allow adequate time for editing the report to reflect resolved issues identified during the presentation
  - Generally, the room should be scheduled for at least 1 hour, the presentation should be no more than 35 minutes and allow ample time for audience questions
  - You should contact someone in the department office to schedule a room
  - *Do NOT wait to schedule the room!*

- PARTICIPANTS
  - Project stakeholders, drivers, supporters, and observers
  - Senior design instructors (at least Dr. Hamel and Dr. Reinbolt)
  - *A presentation without stakeholder(s) and instructors is NOT acceptable*
  - You may find online scheduling resources (e.g., www.doodle.com) helpful

- PRESENTATION
  - The presentation should cover *material similar to the written report described below*
  - The presentation should be *approximately 20-30 minutes long* and no longer than 35 minutes (leave time for a question & answer period)
  - Regardless of the room scheduled, the team should *practice the presentation in the scheduled room*, *use the projector and laptop which will be used* on the presentation day, and *be familiar with your presentation slides and equipment*
  - Keep in mind the *presentation is an actual request for approval to adopt the product and continue into commercial production*
  - *Refreshments* (*optional*) - see related study on Fudging the Numbers of student evaluations

Format of the Written Report

The written report should include the following sections:

1. LETTER OF TRANSMITTAL (a cover letter introducing the final design report which is submitted to the stakeholders)
   - Write a *business letter*
   - Address it to the stakeholders
   - *State the purpose of the report*
   - *Ask for specific actions* (instructions for obtaining additional information and for communicating their response to the design team)

2. COVER PAGE
   - FINAL DESIGN REPORT FOR THE (insert name of project) AND (insert names of stakeholders and their affiliations)
   - Date

- Design team (team members, including names, emails, phone)
- Optionally, graphics (such as team logo or design concept) add interest and communicate other values important to the project

3. TABLE OF CONTENTS (include headings below and your own subheadings)

4. LIST OF FIGURES (*optional*)

5. EXECUTIVE SUMMARY (up to 1 page distilling the report into a *clear and terse synopsis*)
    - Introduce *what you are designing*
    - Describe the *assessed stakeholder needs (Phase 1)*
    - Describe *design alternatives considered* and *benefits of your final design* that fulfill the *design requirements to properly function as planned (Phase 2)*
    - Describe *features and test results of your final product design (Phase 4 & 5)* as it has been made to the *manufacturing specifications (Phase 3)*
    - Present pivotal *technical and business merits*
    - *Focus on final design results obtained*; however, it should NOT be a historical accounting of effort to date on the project

6. BACKGROUND (1 page explaining the *problem need, context, and potential benefits* from your design solution)
    - Describe the *source and scope of the need*
    - Identify *stakeholders* affected by the need and *impacts of the need*
    - *Postulate benefits expected* from a viable design solution
    - Present a *review of relevant literature and patents*
    - Describe *previous efforts* to address the need, and explain (in)adequacies of previous solutions
    - The strongest case for design credibility requires *clearly documented needs and potential benefits from the design solution*

7. PROBLEM DEFINITION (1 to 2 pages stating specific *design requirements, such as product attributes and performance expectations*, satisfied by a high-quality design solution)
    - Begin with a *goal statement that concisely defines the purpose of the design effort* and *key business objectives*
    - Follow it with a *list of functions and requirements, including metrics*, that will be used to demonstrate that these have been satisfied
    - Identify specific *constraints and societal expectations* that must be satisfied by the design solution
    - Identify *key sources used for your project learning*

8. CONCEPT DEVELOPMENT (2 to 4 pages describing the *process used by the design team to search for feasible solutions*)
    - Clearly *show divergent thinking*: thinking outside the box and expanding the design space
    - Address *both original ideas and those derived from other sources*

- Include *illustrative sketches/drawings/diagrams* and *morphological charts and decision matrices comparing concepts against design criteria*
- Describe the *effort of the design team to identify relevant solution ideas*, and communicate a message about the team's expertise and its effort invested in this project
- Additional engineering analysis, test results, and extensive details may be reported in an appendix, if necessary

9. PRODUCT DESCRIPTION (3 pages describing *the design and features important to its success*)
    - *Present the selected and detailed design* and assert *achievements necessary for meeting or exceeding stakeholder expectations*
    - Describe the *integration of components, including user interface*
    - *Highlight novel features* and their relation to your *"value added" specifications*
    - Summarize important *manufacturing and assembly results*
    - *Include photos, drawings, or diagrams explaining key features and functions*

10. DESIGN EVALUATION (2 pages presenting *results of evaluations conducted to check performance against the established design requirements*)
    - *This section is pivotal for decision makers, it must prove that the product satisfies design expectations of stakeholders*
    - Include a key items from a *failure modes and effects analysis, design calculations, and results from experiments*
    - Estimate *cost to replicate prototype*

11. RECOMMENDATIONS & FUTURE WORK (up to 1 page setting *clear recommendations and rationale for adoption and implementation of the design product*)
    - Emphasize the most important features of the product: *projected financial benefits and performance strengths* or advantages over competing products
    - Recommend *actions for continued development*
    - Include the *size, duration, and cost of the continued effort*

12. APPENDICES (*optional*)
    - Present *supplemental materials* that support the report body but are too lengthy or have less refinement than those contained in the body (such as calculations, drawings, lists, computer programs, tables, figures, or narrative)
    - Each appendix should be self explanatory and be referenced in the report body

Measures of Final Design Quality

The quality of the final design presentation and report are determined by their impact on the stakeholders and course instructors. They must build a compelling

case for adoption of the designed product and leave no doubts about the value of the product or the potential for its success or business viability. The team must present a high quality final design in a very professional manner. Specific criteria for assessing the final design presentation and report are defined below.

*****Important grading rubric table located on next page*****

Criterion	Assessment (Score)		
	Engineering intern (1)	**Entry-level engineer (3)**	**Project engineer (5)**
Overall final design quality	Design is incomplete, unattractive, can be misunderstood, has distracting errors; presentation or supporting materials lack professionalism and credibility	Design is complete, understandable, attractive, nearly flawless; presentation, supporting materials give moderate credibility to team and design product	Design is very complete, flawless, very clear and understandable, compelling, beautiful; entire package emotes product quality, credibility and professionalism
Background	Identifies basic client needs for product; acknowledges few existing products or resources that may influence the development of a solution	States problem context relative to clients and the state of technology within society; reviews most important literature, patents, competitive products	Describes and analyzes problem context in terms of clients' needs, societal and global issues; thoroughly analyzes literature, patents, competing products
Design requirements	Few design requirements defined; most are loosely defined, performance-related, qualitative; few or none based on documented client needs; broader considerations* neglected	Defines important design requirements based on primary and secondary clients; addresses technical and non-technical requirements and constraints*; many measurable requirements	Skillfully defines comprehensive design requirements based on needs of clients and stakeholders; addresses system-level and lifecycle requirements and constraints*; all are measurable
Concepts development	Vague process to identify, select concepts; little record of decision making process; poorly-defined criteria; little analysis or understanding of concepts evident	Defined process to identify, select concepts; clear measurable criteria for design decisions; aware of state-of-art; basic analysis and understanding of concepts evident	Thorough documented process to identify, select concepts; clear quantitative, qualitative criteria; fully understand state-of-art and concepts; extensive analysis
Product description	Product features lack client-focus; performance not linked to design requirements; no integration of parts; little or no awareness of constraints* or standards	Product evidences client-focus; meets key design requirements; some system integration; some consideration of realistic constraints*, standards	Product delights client; fully meets design requirements; components skillfully integrated into whole; careful consideration of life cycle issues, constraints* and standards
Economic analysis	Vague estimates of product costs; does not consider other business issues	Reasonable estimates of costs and value to client; markets/users identified for product	Reliable estimates of life cycle costs and benefits to client; markets/business potential defined
Case for adoption	Project strengths questionable; serious doubts about project success or business viability	Some project strengths, risks identified; reasonable potential for success and business value	Compelling case for success of project; risks managed; clear, strong business potential

* *Incorporate engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.*