PHASE 2 ~ CONCEPTUAL DESIGN
Deliverable 10 ~ Interim Design Presentation & Report

INSTRUCTIONS. Present your conceptual design findings and project progress to the stakeholders and instructors; in addition, write an interim design report about the product development, which will be sent to the stakeholders with a cover letter of transmittal. Your presentation slides and written report are due electronically and you should add them to your design history file as well. Your documents should have the filename convention Team-*yournumber*_del10_report or Team-*yournumber*_del10_presentation accordingly.

Purpose

In the design process, a critical decision point occurs after a conceptual design has been created and before the detailed design is initiated. At this point, stakeholders' approval is required before a design team may continue the project into the detailed design stage. Typically, a design team makes an oral presentation to offer rationale and plans for development of a detailed design. A written report follows that explains the resolution of any issues identified during the design presentation and provide technical justification for the design, including supporting data, sketches, and estimates of resources required for completion of the detailed design. This interim design report becomes the primary documentation from which future project decisions are made.

Critical Information

The interim design presentation and report must effectively communicate the credibility and value of the conceptual design to stakeholders, instructors, prospective investors, or other decision makers. A realistic design solution should be defended by explaining key features of the proposed design concepts and their relationships to stakeholder needs and societal expectations, methods used, intermediate results obtained, additional resources required, and evidence for a final product that will have value to potential users and investors. The quality of the interim design will make a statement about the design team's professional competence, its attention to detail, and the credibility of the conceptual design.

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 of December 12th* 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 Pam Ward in DO 414 to schedule a room
- *Do NOT wait to schedule the room!*

- PARTICIPANTS
  - Project stakeholders, drivers, supporters, and observers
  - Senior design instructors (at least 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 continue the design project* into the next phase of the design process (i.e., beginning the detailed design phase in the spring semester)
  - *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 interim 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
   - INTERIM CONCEPTUAL 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 (½ page distilling the report into a *clear and terse synopsis*)
    - Introduce *what you are designing*
    - Describe *benefits of your conceptual design solution* that fulfill the functions and requirements to meet the stakeholders needs
    - Present pivotal *technical and business merits*
    - *Focus on results obtained*; however, it should NOT be a historical accounting of effort to date on the project

6. BACKGROUND (½ to 1 page explaining the *problem context and justification* for design resources to solve it)
    - Describe the *source and scope of the need*
    - Identify *"clients"* affected by the need and *impacts of the need*
    - *Postulate opportunities and 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 project continuation requires *clearly documented needs and potential benefits from a solution*

7. PROBLEM DEFINITION (1 page summarizing the contractual obligations of the design team relative to the specified design project effort)
    - State *problem needs in terms that establish specific requirements* (attributes or performance expectations) for a high quality design solution
    - Begin with a *goal statement that concisely defines the purpose of the design effort*, *the deliverables* to be produced, primary and secondary *clients*, 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

8. PROJECT PLAN (½ to 1 page summarizing of all the work that will have to be performed)
    - Identify *knowledge areas* important to the project and *how the team has developed knowledge and skills related to these areas*
    - Summarize *references used*, *resources acquired*, and *engineering tools in place* for the proposed work
    - Progress to date should be communicated in a *work breakdown structure and Gantt chart*

9. CONCEPTS CONSIDERED (3 to 4 pages describing the *landscape explored by the team in its search for design solutions*)
    - Clearly *show divergent thinking*: think outside the box and stretch the envelope to expand the design space
    - Address *both original ideas and those derived from other sources*
    - Summarize the *scope of ideas* considered and *highlight the most creative and relevant concepts* for the overall solution and for its component parts
    - 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 and test results may be reported in an appendix, if available

10. CONCEPT SELECTION (1 page describing *the "best" concepts*)
    - Clearly *show convergent thinking*: narrow the design space to focus on the "best" alternative(s)
    - Describe the *processes and rationale used for selecting the "best" concepts* for the overall product (the system architecture) and for the component parts of the product design
    - Include summary *tables comparing concepts against design criteria* (e.g., screening matrices or selection matrices) or summary evaluations of specific concepts
    - Keep extensive details, if necessary, in a section of the appendix

11. SYSTEM ARCHITECTURE (2 pages describing *the conceptual design*)
    - *Present the conceptual design* and assert *its potential to meet or exceed stakeholder expectations*, those to be achieved after subsequent detailed design and development
    - Describe the selected conceptual design with its *overall architecture and component integration*
    - *Explain how major components satisfy important design requirements*
    - *Highlight novel features* to show their potential to outperform competing products
    - Present *results from component testing or analysis, if available*, to defend performance claims
    - *Overall, make a convincing case for the technical and functional merits of the design*

12. FUTURE WORK (½ to 1 page)
    - *Define clear recommendations and rationale for project continuation*
    - Summarize *principal technical and non-technical features* of the conceptual design that *satisfy important needs of stakeholders*
    - *Highlight unresolved issues*
    - Provide details on the *anticipated work schedule and milestones* for the next phase of the project
    - *Request specific approvals or authorizations* needed for project continuation, if necessary

13. 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 Interim Design Quality

The quality of the interim design presentation and report are determined by their impact on the stakeholders and course instructors. They must build a compelling case for continuation of the design project effort and leave no doubts about the value of the product or the potential of the design team to deliver the contracted product within the allowed time and budget. The team must present a high quality conceptual design in a very professional manner. Specific criteria for assessing the interim design presentation and report are defined below.

Criterion	**Assessment (Score)**		
	Novice (1)	**Entry-level engineer (3)**	**Professional engineer (5)**
Background	Identifies most basic stakeholder needs for design; acknowledges few existing resources that may influence the development of a solution	States problem context relative to both stakeholders and the state of technology within society; aware of relevant literature, patents, and existing products	Describes and analyzes problem context in terms of stakeholders' needs and societal/global issues; thoroughly analyzes relevant literature, patents, and products
Design requirements	Few design requirements defined; most are loosely defined, performance related, and qualitative; few or none based on documented stakeholder needs'; broader considerations* neglected	Defines important design requirements based on stakeholders; addresses technical and non-technical requirements and constraints*; includes many measurable requirements	Skillfully defines comprehensive design requirements based on needs of stakeholders; addresses system-level and lifecycle requirements and constraints*; all are measurable
Concepts considered	Limited number of useful concepts; do not reflect knowledge of state-of-the-art; little creativity	Useful concepts for components and overall design; reflect knowledge of state-of-the-art for at least some parts; moderate creativity	Many useful concepts for components and overall design; reflect knowledge of state-of-the-art for all components; significant creativity
Concept selection	Vague process to select concepts; little record of decision making process; poorly-defined criteria	Rational, documented process to select concepts; clear measurable criteria in making design decisions	Quality stakeholder-focused process for selection; fully documented; clear quantitative and qualitative criteria

Criterion	Assessment (Score)		
	Novice (1)	**Entry-level engineer (3)**	**Professional engineer (5)**
Concept quality	Team partially understands needs of stakeholders; concept not viable, does not address some important criteria*	Team understands main technical and nontechnical needs of stakeholders; concept plausible, addresses most crucial requirements, constraints*	Team fully understands diverse needs of stakeholders and society; concept innovative, viable, satisfies all requirements and constraints*
System architecture	Product features lack stakeholder focus; performance not linked to design requirements; no integration	Product evidences stakeholder focus; meets key design requirements; some system integration	Product delights stakeholders; fully meets design requirements; components skillfully integrated into whole
Economic analysis	Vague estimates of product costs; does not consider other business issues	Reasonable estimates of costs and value to stakeholders; markets identified for product	Reliable estimates of life cycle costs and benefits to stakeholders; business potential well-defined
Case for continuation	Project strengths unclear; serious risks to project completion or to business viability	Project strengths and risks identified; reasonable potential for project success and for business value	Compelling case for success of project; risks managed; clear, strong business potential
Overall interim design quality	Weak case for continued product development; conceptual design is incomplete or meets few design requirements; little or no evidence justifying product financially; report is incomplete, unattractive, can be misunderstood, has distracting errors	Credible case for continued product development; sound conceptual design meets most design requirements; some indication that product will be economically feasible; report is complete, understandable, attractive, few flaws	Excellent case made for continued product development; innovative and competitive conceptual design meets all design requirements; credible evidence that product will be financially successful; report is very complete, very clear, compelling

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