Design Proposal

Cover and binding
- Binding can be spiral, "comb," velo or a loose-leaf binder
- Stapled document is unacceptable

Organization
- Recommend these sections and/or major headings
    - Title page
    - Tables of Contents, Figures, and Tables
    - Executive summary
    - Introduction, and major users & requirements (Can be two sections)
    - Summary of research methodology
    - Project Scheduling (RAM Chart and Gantt Chart)
    - Description of design
    - Discussion of recommended next steps
    - Conclusions (and Recommendations)
    - References
    - Appendices
- Recommend the liberal use of sub-headings as appropriate
- Put important figures and tables in main body
- Put details in appendices

Title page
- Full title, i.e. Design Proposal with project name
- "Submitted by" list
    - Full names of individual team members
    - Team Name
    - Department Name
    - City and state
- Date of final presentation
- "Prepared for" list
    - Professor _____
    - Mechanical Engineering Department
    - School of Mechanical Engineering
    - Istanbul Technical University
    - Gümüşsuyu 34437 İstanbul
- Optionally, a colored picture, drawing or sketch of the design prototype or design usage
- Optionally, Istanbul Technical University, School of Mechanical Engineering, and/or ITU logos in bottom left and right coroners, respectively

Table of Contents

- Include each heading and subheading with page number
- List letter, title, and page number of each appendix
- List Arabic number, title, and page number of each figure under "List of Figures"
- List Arabic number, title, and page number of each table under "List of Tables"
- Use leaders (series of periods) and put page number at right margin, right justified

Executive Summary

- Is limited to one page
- Stands alone and does not refer to main body of the report
- Entices reader with opening general sentence or two
- Summarizes, briefly, the problem and research methodology
- Concentrates on the design and only **key** features and benefits or concentrate on major requirements and how features fulfill them
- Uses visual aids such as sketches, pictures, drawings, tables, etc. as relevant
- Summarizes scope and limitations of the design, if any
- Summarizes possible further work, conclusions or recommendations, as necessary

Introduction and Major Users & Requirements (Can be separate sections)

- Start on new page
- Entice reader with opening general sentence or paragraph leading to problem statement
- Describe problem (Mission) statement
- Explain the reasons that it is a problem including
    - Current product (if one exists) and its shortcomings and possible improvements and
    - The people affected (major users only) and their needs
- Perhaps, list major requirements; refer to Appendix A: Design Documentation for more detailed requirements
- Provides a roadmap to the rest of report, listing major sections and what can be found in these sections (Note that this roadmap was not described in the text)

Summary of research methodology

- List **significant** inputs only
- Emphasize synthesized ideas; avoid chronology and narrative
- Put necessary details in appendices
- Discuss **briefly** major inputs of research only, such as:
    - clients,
    - internet web sites,
    - retailers and manufacturers,
    - competitive and model products,
    - building of mockups,
    - user interviews, testing, and observations,
    - performance testing,
    - expert interviews,
    - brainstorming and team creativity,
    - etc.
- Use this rule of thumb: This section should be only a few paragraphs and, at the most no longer than a third of a page. Full discussion of important results of research is included in the design description below and more minor results can be included in the appendices. However, if there is a major disagreement with the client on the

design requirements and results, then a more detailed discussion of your research results to explain your disagreement is warranted before the design is described.

Project Scheduling (RAM Chart and Gantt Chart)
- Start on new page
- Prepare Responsibility Allocation Matrix (RAM Chart) for week-by-week
- Describe the project works with Gantt Chart

Description of design
- Begin with an overview of the design
- Describe individual features or physical components
- Use figures (pictures, drawings, etc.) in a logical fashion using arrows and labeling in the figures to point to details
- Put important figures here, not in appendices, on full pages or embedded in the text.
- Describe how the design will be used, perhaps using a user scenario (pp.35-36)
- Describe, perhaps in table format, the features, benefits and supporting information (evidence [research, testing, & users], authority [client & experts], and/or reasoning). Make use of synthesized research results here, particularly as embodied in the design documentation
- Include any significant safety and/or fault analysis information, as needed

Discussion of recommended next steps
- Possible future steps include
    - Further user and /or performance testing
    - Further prototype development
    - Consideration of new features, materials, etc.
    - Alternative designs (Details in appendices)
- Implementation plans (Details in appendices)
    - Procedure for construction of additional prototypes
    - Instructions for operation
    - Cost of product based on design for small scale and/or large scale production
    - Maintenance issues
    - Safety and fault analysis considerations

Conclusion (and Recommendations)
- Summarize design objective, design and its key features and benefits briefly
- State implications of design on client, users, etc.
- Summarize recommendations for production and/or further development and testing as needed

References
- Place at end of the main body and not as an appendix
- List sources of information and research, as necessary, e.g.
    - Client contacts: meetings, phone calls, email, etc.
    - User interactions: observations, interviews, testing mockups, etc.
    - Sources of competitive and model products information, such as retail stores and manufacturers
    - Expert contacts: meetings, phone calls, emails, e.g. with Steve Jacobson
    - Other teams' ideas or input used in your design
    - Sources of information on materials used in prototype
    - Books, journals, newspapers, etc. read and internet sites visited. If possible, annotate by evaluating the worth of information

        - Brainstorming meeting(s) (Reference to BS notes in design notebook)
- If available, include web site address and two dates: the original published and date that it was downloaded
- Cite all references in main body or appendices
- Use MLA style documentation as shown in Appendix B of text

Appendices
- List as A, B, C, etc.
- Start separate pages and have descriptive titles
- Contain only one kind of information
- Have a brief introduction, explaining the contents and its source, if not self-explanatory. An appendix must stand on its own
- Are directly referenced and **briefly discussed** in the main body of the report
- Could include, **only as necessary and relevant**:
    - Client Interview guide and summary
    - User Interview and Observation guides and summary
    - Detailed results of performance testing
    - Details on safety and/or fault analysis
    - Summary of expert interviews, retailer and manufacturer contacts, etc.
    - Summary of alternative mockups and lessons learned
    - Detailed tables of data
    - Brainstorming clustered and prioritized results, eliminating unimportant data (detailed brainstorming list goes in notebook not here)
    - Construction procedure and estimated cost of additional prototypes and/or a commercial product including list of materials
    - Operating instructions for design
    - Maintenance of design
    - Possible future designs

Design Documentation – Always "Appendix A"
- Mission Statement
    - Solution-independent
    - Measurable objectives
- Constraints
    - Truly constraints that cannot be changed
- Users & Stakeholders
    - Primary/secondary users and stakeholders accurately identified
- Requirements
    - Directly address the conscious and unconscious needs of users and stakeholders
    - Comprehensive enough
- Specifications
    - Precise and measurable
    - Comprehensive enough
    - Placeholders included when metrics are unknown
    - Solution-independent

Audience: Directed to client and client organization in a persuasive and professional tone

Timing

- Bound color copies of report available at final presentation for each client, two faculty members, team members, or others as needed.
- Report posted on Depot on day of final presentation before presentation in folder "final_deliverables" under title using title, "Section XX team YY design proposal"

Formatting

- Use line spacing, margins, and fonts from standard EDC report format
- Pagination
    - Page numbers are centered in the footer
    - Title page, table of contents, list of figures, and list of tables
        - Use lowercase Roman numerals, *i, ii, iii, iv*, etc. for page numbers
        - No page number on the title page
    - Rest of the report starting with executive summary
        - Use Arabic numbers, 1, 2, 3, etc. for page numbers
        - Continue same sequences of pages numbers for appendices, too
- Make headings and sub-headings stand out visually
- Break up dense text areas with tables and figures, if possible
- Eliminate spelling and grammatical errors by using spell checker and proofreading
- Put file name (section#, team# and report name) and version # in file header

    e.g., 13_4 Design Proposal

Visual

- Looks professional and attractive
- Use sketches, photos, graphs, charts, maps, etc. where appropriate
- Use bullets and lists where appropriate
- Use parallel structures in headings, sub-headings, bullets and lists
- Use tables and figures where appropriate
    - Number 1, 2, 3, etc.
    - Put number and title above tables and underneath figures
    - Reference sources in notes as needed
- Put significant figures and tables in main body not in the appendices

Writing Style

- Communicate clearly; strive for precision.
- Minimize wordiness, vagueness, and hackneyed expressions
- Be objective and factual; avoid emotional language.
- Avoid lengthy paragraphs; have a topic sentence; and show the logical flow of ideas
- Use active rather than passive voice
- Avoid narrative descriptions
- **Emphasize persuasion**
    - Translate design features into benefits
    - Back up benefits with evidence (research, testing, & users), authority (client & experts), and/or reasoning
    - **Anticipate and answer questions and objections**
    - Demonstrate that you know the process to develop an excellent design, that you followed this process, and that your design is the best possible given your available time, resource, budget, and the design due date.