

FORMAT

All final reports are to be submitted on standard 8-1/2" x 11" paper. Margins must be at least 1", type size must be 12 point with no more than 3 lines per inch, and there should be no page reductions. Include original quality illustrations (photographs, color prints, etc.) in all copies of the final report. All figures and tables should be integrated with the text unless they clearly belong in an appendix.

CONTENT

Your team's final report must document the following phases of the design project:

1. Product (or process) detailed design and analysis
2. Procedure for prototype fabrication and assembly (or process implementation)
3. Testing procedure
4. Results and evaluation of the prototype (or process)

The final written report must include a cover letter, title page (including a summary), table of contents, body of the report (items 1-4 above), and a list of references. In addition, the following appendices must be included:

- Appendix A: Project schedule (Template # 1)
Appendix B: Task descriptions (Template # 2)
Appendix C: Rationale and feasibility checklist (Template # 3)
Appendix D: Mapping of Functional Requirements to Design Parameters (Template # 4). This appendix must include a thorough explanation of all calculations and / or computer analysis, including units. All of the analyses should be documented to make it clear that your work was based on sound engineering principles.
- Appendix E: Fabrication and assembly procedures (Templates # 5, 6). This appendix must include:
- ✓ A list of purchased components, including the vendor address, phone number, and contact person, part numbers, quantity and cost
 - ✓ Detailed drawings with dimensions and tolerances
 - ✓ A bill of materials that lists all required materials, quantities, costs, and supplier contact information
 - ✓ Drawings to illustrate the assembly procedure
 - ✓ Facilities and equipment that were used to fabricate or assemble the prototype
 - ✓ Any sub-contractual arrangements for fabricating or assembling the prototype
- Appendix F: Health and safety plan (Template # 7)
Appendix G: Testing procedure (Template # 8). This appendix must include any collaborative arrangements for testing the prototype.
- Appendix H: Results and evaluation (Template #9). This appendix must include:
- ✓ Prototype performance results and evaluation of the data
 - ✓ Detailed accounts of both budgeted and actual costs. Include budget sheets for contributions from the Mechanical Engineering Department and any other participating organizations. ME 495 and ME 499 student's time should be budgeted as a contribution by the ME Department at a rate of \$30,000 per engineer-year with 25% benefits.

Cover Letter

You are addressing two specific parties: the client and the faculty coach. Each must receive a copy of the final report with a cover letter addressed to the recipient.

Title Page

Design project title

Team contact information

The names of all team members, affiliations (e.g. Senior Mechanical Engineering Student, University of Washington, Seattle), and contact information (email addresses, phone numbers) must be listed on the title page.

Summary

The final report must contain a Project Summary. The project summary itself **MUST** fit onto the bottom one-third of the title page (approximately 250 words). The summary is not intended for the general reader; consequently, it may contain technical language comprehensible by persons in disciplines relating to the design project. The summary should be a self-contained, specific description of the design project results and should focus on:

- Overall project goal(s) and specific objectives
- Relevance
- Concise description of product (or process) design
- Evaluation of the prototype (or process) in terms of performance, cost, and overall project goal(s)

The importance of a concise, informative project summary cannot be overemphasized.

Table of Contents

A Table of Contents, itself not paginated, should be placed immediately after the title page. This table should direct the reader to the pages for all sections of the report including appendices.

Body of the Report

The body of the final report should be assembled so that an **Introduction** immediately follows the **Table of Contents**. The introduction should concisely state the overall goal(s) of the project and specific objectives, and it should refer to the design concept described in the ME 395 report. Page numbering for the introduction should start with 1, and should be placed on the bottom of the page. After the introduction, the body of the report should contain the following major sections:

Product Design and Analysis

Provide complete and thorough documentation of the product (or process) design and analysis:

- a) Provide a concise, descriptive overview of the entire design.
- b) Document patentable ideas or contributions, including intellectual property protection, if appropriate.
- c) Discuss how the design meets all functional requirements and constraints. Refer to mapping of functional requirements to design parameters, provided in Appendix D.
- d) Discuss the results of all engineering analyses. Refer to detailed calculations provided in Appendix D. How were the results used to choose design parameters?
- e) Discuss choice of materials.
- f) How does the design meet reliability requirements? Discuss worst case environment and worst case use.
- g) How does the design meet the requirements of the health and safety plan? Refer to Appendix F.
- h) Provide a summary of budgeted costs. Refer to Appendix H, which provides a detailed breakdown of budgeted costs including materials, labor, tooling, equipment, external support, etc.

Fabrication and Assembly of Prototype

Carefully explain the procedure for fabricating and assembling the prototype:

- a) Describe the equipment to be used for fabrication and assembly. Refer to detailed information in Appendix E.
- b) Describe purchased components. Refer to the list of part numbers, prices and vendors in Appendix E.
- c) Describe machined components. Refer to detailed drawings and the bill of materials in Appendix E.
- d) Discuss how the design meets manufacturability requirements. How will scrap be minimized?
- e) Describe the assembly procedure and refer to assembly drawings in Appendix E.
- f) Discuss life cycle analysis. Are parts of the product recyclable? Is the product easily disassembled?
- g) Identify top 20% assembly and parts cost contributors; identify means to reduce cost and waste.

Testing Procedure

Carefully explain the procedures for testing the prototype:

- a) Explain the test procedures that you will use to determine whether or not the prototype meets each of the functional requirements / target specifications. Refer to Appendix G.
- b) Describe equipment to be used for testing the prototype.
- c) Report on the accuracy of the test equipment.
- d) Describe the test conditions.
- e) Discuss what will be measured and how the data will be collected and analyzed.

Results and Evaluation of Prototype

Describe the test results followed by a full evaluation of the prototype performance and cost. This section should clearly document that the original project goals were met. Otherwise, an explanation of why specific requirements were not met must be provided.

- a) Report on the results of prototype testing. Refer to Appendix H.
- b) Report on any deviations from conformance to functional requirements / target specifications.
- c) If there are certification requirements, does the prototype meet them?
- d) Report on life cycle testing if applicable.
- e) Provide a summary of actual costs. Refer to Appendix H, which provides a detailed breakdown of actual costs including materials, labor, tooling, equipment, external support, etc.
- f) Include a cost reduction plan if appropriate.
- g) Provide final evaluation of the prototype performance, appearance, and cost.
- h) What modifications, if any, are recommended?
- i) Discuss the aspects of the project that met the client's expectations.
- j) Discuss any aspects of the project that fell short of the client's expectations.

References

The report must contain discussions of the relevant technical and academic literature. The literature must be formally cited in the list of references. All citations should be complete, including titles and all co-authors, and should conform to an accepted journal format.

Evaluation Form

Project: _____ **Team Members:** _____

Cover Letter, Title Page, and Table of Contents **(5)**

Are all of the required elements clearly present? _____
Is the summary self-sufficient? _____

Product Design and Analysis **(20)**

Is the rationale for specifying design parameters clear? _____
Is the engineering analysis accurate and is it well documented? _____
Are all parts, drawings, bill of materials provided? _____
Is choice of materials discussed? _____
Was design for manufacturability considered? _____
Were reliability and life cycle analyses completed? _____
Does the design meet the requirements of the health and safety plan? _____
Is a detailed breakdown of budgeted costs provided? _____

Fabrication and Assembly of Prototype **(15)**

Is the fabrication / assembly procedure fully documented including a list of equipment? _____
Was a health and safety plan prepared and implemented to avoid hazards from materials, procedures, or hazardous situations? _____

Testing Procedure **(15)**

Is a test procedure provided along with documentation of test equipment? _____

Results and Evaluation of Prototype **(15)**

Was the prototype tested? _____
Were the results documented along with any deviations from conformance to specifications? _____
Is a detailed breakdown of actual costs provided? _____
Is a full evaluation of the prototype performance, appearance and cost provided? _____

Literature Review and List of References **(5)**

Does the report contain adequate discussion of the literature? _____
Is all work by others appropriately cited? _____

Writing **(5)**

Is the writing clear, and is the style appropriate? _____
Is the report neat, well organized and appropriately formatted? _____

Appendices **(20)**

Total _____

/100