MSE 3380
Mechanical Components Design
for Mechatronic Systems

Report Guidelines

Dept. of Mechanical & Materials Engineering	Instructor: Prof. Aaron Price
Faculty of Engineering	Interim Report Due: 5:00 PM on March 22nd
Western University	Final Report Due: 5:00 PM on April 5th

1   General Report Requirements

The report should follow a clear, complete, and logical presentation and discussion of the problem and solution, with consistent and professional formatting. Use captions where required. Ensure to justify the reasons for the design choices made in your analysis.

2   Required Report Sections

Title Page Indicate title of report, date of submission, **TEAM NUMBER**, team member names, and student numbers. The title page is **not** included in the page limit.

Table of Contents Number all pages of the report and refer to section headings. The table of contents also does **not** count towards the page limit.

Scope/Introduction Briefly introduce the design problem and relevant background information. The focus should be to identify the purpose of the report.

Specifications and Performance Criteria List the given specifications and constraints imposed on the design. Reports must correctly identify all key output requirements and specifications for the system. Also state and justify your general assumptions concerning the environment for the product. This is the starting point of the analysis.

Concept Detail the concept of the design in terms of its configuration and consideration of the design performance and constraints. You can refer to a figure in the appendix or use a set of figures in this section (preferred).

Analysis Identify the critical components you analyzed. Start from the given data and determine the loading on the overall structure. You should then have a subsection for each component analyzed where you detail:

- Loading and dimension data
- Free body diagrams, (shear and moment diagrams where appropriate)
- Component material and properties (cite reference for properties)
- Results (e.g. static stress, fatigue stress, etc.)
- Factors of safety and explain why you consider them sufficient

Conclusions A short summary of the above analysis and relevant comments.

References Clearly identify sources you used to perform the analysis. Consult the IEEE Reference Guide for citation style information.

Appendices (as required) An area to collect supporting / supplementary documentation. This will include the detail and assembly drawings, specification sheets, hand calculations and other data. The appendices must be referenced in the body of the report. Appendices do **not** count towards the page limit.

3   MATLAB Calculations

Where you are requested to submit MATLAB calculations, ensure that these are well presented. The purpose of engineering design calculations is not only to verify that a design is acceptable but also to provide clear documentation so that an engineer, not familiar with this project, could reproduce and verify your design calculations. Take note of the following in preparing your calculations:

- Provide clear headings to indicate the purpose of each calculation.

- As your design progresses, multiple iterations are required, therefore, create your MATLAB script such that key variables are user inputted. It is recommended that you verify your computer input using an example from the textbook to ensure you have entered the formulae correctly.

- Clearly state and discuss the validity of all key assumptions.

- Always explain what it is that you are trying to achieve.

- Outline the reasoning behind your choice for safety factors.

- Provide all key relations and provide references unless the relations are commonplace.

- Define all notations and provide sketches if needed to ensure the reader knows unequivocally what you mean and that your notation is clear.

- Provide free body diagrams.

- Highlight key results.

- Typically, a calculation in the report is presented in the following fashion:

- State the equation used and assumptions.

- Show a table or list of values for the variables in the equation.

- Give the result or table of results if the same calculation is repeated.

- Do not show the substitution and simplification process of the calculation.

- The final answer should be presented and a brief discussion of the adequacy of the proposed design should follow.

NOTE THAT POORLY PRESENTED CALCULATIONS WILL NOT BE GRADED.

4   Design Drawings

For both reports, each group will develop an assembly drawing and/or component drawings that illustrate the key aspects of the design. It is recommended that drawings be done using SolidWorks. The assembly drawing will be a single cross-sectional view of the gearbox in which all shafts, gears, and bearings appear in side view or full section. Drawings must be either all in metric or Imperial units. Do not switch between units in drawings or between drawings as it will be difficult to see how the parts fit together.
Label all key components using a part number (in a circle) connected by a leader to the part.

5   Questions and Clarifications

All questions regarding the project should be directed via email to Mr. Ben Holness (fholness@uwo.ca).