

## **D5 Report formatting guidelines**

This document provides formatting guidelines for your written report indicating what information belongs where. Refer also to the deliverable design content requirements from the project description document on Canvas for additional information on the level of detail required for each design element below.

### **Report structure**

- **File format and filename:** Submit report as PDF. Use file naming format: *Team#\_P2D5.pdf*
- **Title page:** Project title, team number, team member names, lab section number. Include a picture of the final project walker with theme decorations.
- **Report body (total 6-9 pages)**
  1. **Abstract or Executive summary**
    - A brief discussion of project goals, mechanism design, theme and, most importantly, a summary of performance results.
  2. **Project goals and design specifications**
    - A more detailed discussion of project goals (listed in the project description), including additional design specifications that you wanted your design to meet (beyond those listed in the project description).
  3. **Detailed design discussion**
    - A summary of your final design, including important features on different sub-systems, and why it met the goals and design specifications mentioned in the previous section.
    - Discuss the dispensing mechanism design.
    - Discuss the leg/movement mechanism design, the gait pattern, coordination between legs, and velocity estimate.
    - Discuss coordination between dispensing and leg mechanisms given a single drive motor. Include gear ratios and how coordination of motion between different elements was achieved.
    - Numbered figures including:
      - Multiple photos or CAD schematics of the whole design with colored and labeled parts, and views of critical sub-systems.
      - Label overall dimensions.
      - Leg/mechanism motion. Gait pattern.
    - Explain any iterations that you performed during the design process or problems found and addressed.
  4. **Creative theme**
    - Discuss the creative theme and how it was designed to **thrill, amaze, and amuse** the viewer
  5. **Mechanism performance**
    - Review robot performance at the final event on Friday December 12. Final size dimensions, dispensing consistency, straightness of motion, and average speed? Did it have problems?

- Discuss how the performance of your robot differed from the expected dispensing behavior and predicted speed you computed for the robot. What may have caused these differences, and how could you have generated more accurate predictions?

#### 6. Reflection on design project

- Reflection on your machine's performance, challenges it faced, and suggest ways to overcome them if you were to iterate the design again. Reflection on your team dynamics – discuss some pointers to offer future teams to help with good team dynamics such as what went well and what could be done differently.

#### • Appendices (no more than 10 pages)

**Appendix A (Drawings):** Exploded assembly engineering drawing views of full machine and individual legs and dispensing subsystems with BOM for final design. If you have additional 3D CAD views that do not fit in report body, you can put them here. Include multiple images on same page.

**Appendix B (Expense Report):** Discuss the materials, manufacturing costs and purchased components that were used for fabrication. Brief overview of the final expenses per category. Include expense report table by importing content or image (landscape) from the Excel Expense Report Template in Canvas. Include both Project 1 and Project 2 expenses. (Project 1 laser cutting and 3D printing manufacturing costs do not need to be included.)

**Appendix C (Team Contributions):** List each team member's contribution to the design process. Include signed academic integrity statements from each team member (use form below). Digital signatures (uploaded picture, tablet, etc.) are acceptable. A missing signature means that team member will get no credit for the assignment, and the rest of the team will get a small penalty for not including them. Forging another team member's signature means that no team member will get credit for the assignment.

*I, \_\_\_\_\_ (Print Name) \_\_\_\_\_, hereby agree that I followed all academic integrity policies while producing this report. In addition to my original contributions, I have read through this entire report and certify that all materials, including the designs, are correct and not plagiarized.*

*Signature:* \_\_\_\_\_

*Date:* \_\_\_\_\_

**Appendix D (optional):** The course staff may want to reuse reports as examples. Please write a short message indicating if you would be okay with de-identified parts of your report being used as an example. Your response to this question will not impact on your grade.

### Report formatting guidelines

- 11-point font or larger (ideally 12 point), 1" margins, single spaced, and page numbers.
- Titles or section labels may be larger or bolded.

- Report should be logically organized and well written, with in-depth discussion. It should not be a “figure dump”.
- Report should follow the length guidelines and not be overly short or long.
- All pages should be numbered.
- The main body must stand alone. Always summarize the results, including numbers, in this section. Address the requested issues or questions. The reader should be able to digest everything from the main body without referring to the appendices.
- The appendices should support and explain each point that you made in the main body. If the main body states that a set of loads satisfies a moment balance, an appendix should support this point with calculations, free body diagrams, and/or computer simulations.
- The word “data” is a plural word.
- Cite references if applicable
- All team members MUST review and edit the final report.

## Figure & table formatting guidelines

- For each figure, include *descriptive* figure and table captions. Add caption below figures, but above tables. Number figures and tables separately, but consecutively in the order that they appear, for example Figure 1, Figure 2, Table 1. Refer to these items in your text, e.g., “The rocker link swept through a 30° arch (Figure 3).”
- Every figure in the body of the report should be referred to in the discussion in the order that they appear.
- Every figure or table in the appendices should still be numbered (e.g., Figure A-1) and have a description caption. However, they do not need to each be individually discussed in the body of the report. Instead, the entire appendix may be referred to in aggregate.
- Figures should not be overly large or small, and should be formatted to not waste space in the text. Overly large figures waste space, and make it difficult to stay in length while including in depth discussion. Overly small figures are difficult to read. Use text wrapping on smaller figures to minimize empty white space.
- All figures should use good plotting and presentation practices, including large font size, thick lines, axis titles, units, and labeling with meaningful caption or label. Provide labels (text boxes and arrows) to identify key components. Recall that arrows point from text to object.
- Hand sketches must also be easy to see all parts, with clear, dark lines and labels.
- All images should be easy to read and not pixelated or blurry or otherwise illegible, handwriting should not be small or illegible.
- Use color to distinguish different components in CAD renderings. Show mechanism in context of the environment (e.g., include the rope).
- You should use generally use SI units.

## Things to avoid

- Making the report fit on one page by using a tiny font, close line spacing, and narrow margins. Instead, look for ways to trim down the report without hurting the content. (Idea: If a sentence contains a phrase like “it may be seen that” or “it has been found that,” you can eliminate the phrase without changing the meaning of the sentence).

- Putting one figure or table per page, unless the size warrants the need. Using poorly formatted figures so that only one line of text fits on the page while there are large amounts of unused white space.
- Giving results to six significant digits when the input data had only two or three significant digits, or the results were generated graphically.
- Using “I/we did . . .”, “I/we found . . .”, “I/we calculated . . .” in *every* sentence. It is fine to use “I/we” now and then in technical writing, but only occasionally.