Interdisciplinary Capstone Design
Product Requirements Document

Assignment Goal

To write a Product Requirements Document (PRD) for an engineering system, capturing the design functions and requirements for successful operation of the device for its desired useful life.

Learning Outcomes

As a result of completing this assignment, you should be able to:
- <u>Synthesize</u> customer wants and needs into measurable requirements for the new design.
- <u>Estimate</u> (or measure) the inputs required for the device to operate as intended and the outputs generated through using the system.
- <u>Write</u> a summary of the functions and requirements in a concise and organized manner.

Relevant ABET Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Approach and Rationale

Before starting any design project, it is important to have a clear understanding of the targets and constraints for the design. Most importantly, we need to know when the project is considered finished, but we also need to define the guiding principles which will determine our day-to-day decisions for the design. This will allow us to make trade-off evaluations and ensure that the design is able to meet targets for performance, budget, and schedule.

Task

Working in your capstone design team, you are assigned to draft a document (using MS Word or Excel) to capture the *multi-functional requirements* for the system. The suggested approach is as follows:
1) <u>State</u> the desired function(s) of the system. What is it required to do?
2) <u>Define</u> ALL of the required <u>inputs and outputs</u> for the system. They can be in many different forms, including:
    o Mechanical (force, torque, pressure, etc.)
    o Thermal (heat, temperature gradient, etc.)
    o Electrical (voltage/current, power, etc.)
    o Software (logic, user interface, etc.)
    o Magnetic, solar, environmental conditions, or anything else you can think.
3) <u>Outline</u> ALL of the <u>operating environment</u> considerations. Define any limitations, such as:
    o Are there only limited types of **materials** which can be used for the device?
    o Does the device need to have a specific **finish** (e.g. painted, galvanized, coated, etc.)?
    o Does the device need to be **dust- or waterproof**? If so, how much is ingress is allowed?
    o Does the system have any specific **ergonomic** requirements, such as:
        ▪ Limited force a human operator can apply
        ▪ A certain height or position of operator interfaces making them easy to use

4) <u>Identify</u> and estimate any <u>customer expectations</u> for the product:
   - What is the target reliability for the complete system (quantify in % or MTBF)?
   - What is the target useful life (i.e. durability) for the product (typically in hours)?
   - How much do you think a customer would pay for the product (i.e. target price or cost)?

<u>Organize</u> all this information into a single document, ideally using some form of outline. Try to make each requirement statement measurable with a target value. **Once you have written a draft set up requirements, review them in detail with your instructor and client to confirm agreement.**