

The entry below would be likely to receive a **score of 1**, based on the EDPPSR.

The design requirements/criteria are merely listed, and there is no detail to suggest that these requirements have been prioritized. While a few of the requirements include specific detail (e.g., ability to withstand 35 mph wind conditions), others of the requirements listed are incomplete or lacking specificity. Other requirements may appear arbitrary without any explanation as to how they have been derived (e.g., the maximum cost of \$50 per unit). Taken together, these features may lead some readers to consider the entry to be more characteristic of score point 2; however, at least some requirements listed (e.g., “Design must be lightweight and durable”) are better described as “overly general”—a characteristic of score point 1 entries. Furthermore, there is no evidence in this entry beyond the identification of the “target consumer” that the requirements represent the needs of any primary stakeholder groups—that is, there is no evidence of validation of these requirements by any primary stakeholders.

These omissions are ones that are not hard to rectify, and this entry is an example of one that—if subjected to peer and mentor feedback during rather than after the portfolio compilation process—would undoubtedly be revised by adding specific detail, defining terms as needed, and prioritizing design requirements, leading to a higher score. The potential for improvement is supported by the fact that the requirements listed do appear to be ones that are measurable and have the potential to lead to a viable solution to the problem that has been identified.

### Engineering Design Process Portfolio Scoring Rubric Component and Element Titles

#### Component I: Presenting and Justifying a Problem and Solution Requirements

- Element A: Presentation and justification of the problem
- Element B: Documentation and analysis of prior solution attempts
- **Element C: Presentation and justification of solution design requirements**

#### Component II: Generating and Defending an Original Solution

- Element D: Design concept generation, analysis, and selection
- Element E: Application of STEM principles and practices
- Element F: Consideration of design viability

#### Component III: Constructing and Testing a Prototype

- *Element G: Construction of a testable prototype*
- Element H: Prototype testing and data collection plan
- Element I: Testing, data collection and analysis

#### Component IV: Evaluation, Reflection, and Recommendations

- Element J: Documentation of external evaluation
- *Element K: Reflection on the design project*
- Element L: Presentation of designer’s recommendations

#### Component V: Documenting and Presenting the Project

- Element M: Presentation of the project portfolio
- Element N: Writing like an Engineer

**Please Note: Elements M and N require no submission from the portfolio author(s) and are intended to be scored based on the portfolio work as a whole from what has been submitted from Elements A through L**

## Element C - Presentation and justification of solution design requirements

- 5** Design requirements are listed and prioritized, and they are consistently clear and detailed; these design requirements presented are consistently objective, measurable, and they would be highly likely to lead to a tangible and viable solution to the problem identified; there is evidence that requirements represent the needs of, and have been validated by, many if not all primary stakeholder groups.
- 4** Design requirements are listed and prioritized, and they are generally clear and detailed; these design requirements presented are nearly always objective and measurable, and they would be likely to lead to a tangible and viable solution to the problem identified; there is evidence that requirements represent the needs of, and have been validated by, several primary stakeholder groups.
- 3** Design requirements are listed and prioritized, and they are generally clear and somewhat detailed; these design requirements presented are generally objective and measurable, and they have the potential to lead to a tangible and viable solution to the problem identified; there is evidence that requirements represent the needs of, and have been validated by, at least a few primary stakeholder groups.
- 2** Design requirements are listed and prioritized, but some/all of these may be incomplete and/or lack specificity; these design requirements may be only sometimes objective and/or measurable, and it is not clear that they will lead to a tangible and viable solution to the problem identified; there is evidence that the requirements represent the needs, of/and or have been validated by, only one primary stakeholder group.
- 1** An attempt is made to list, format, and prioritize requirements, but these may be partial and/or overly general, making them insufficiently measurable to support a viable solution to the problem identified; there is no evidence that the requirements represent the needs of, or have been validated by, any primary stakeholder groups.
- 0** Design requirements are either not presented or are too vague to be used to outline the measurable attributes of a possible design solution to the problem identified.



Below is a sample design brief to the LED traffic signal problem, including a design statement and criteria, constraints, and parameters that would apply to the prototype design.

## Snow-Clear LED Traffic Signal Modification

**Client:** Illinois Department of Transportation

**Target Consumer:** Municipalities that have converted traffic signals to LED technology or are planning to move in that direction.

**Designers:** Stuart Briber & Ryan Lewis

**Problem Statement:** Even though cities save 89-90 percent in energy costs by using traffic lights with LED technology, the devices are unable to melt snow and ice which can collect inside the signal head and reduce or remove the lights' visibility since they product about 85 percent less heat. At least one death has been attributed to this problem, but many other traffic accidents have been caused in the lat two years.

**Design Statement:** Design , prototype, and test a device that will eliminate snow and ice buildup inside the signal visors of common traffic lights.

### **Parameters / Constraints:**

- Design must be lightweight and durable.
- Design must maintain current traffic signal safety standards.
- All parts must fit on or within a standard 12" diameter traffic signal.
- Design must easily retrofit onto existing devices.
- Must be low-cost to limit the financial burden on target consumers.
- Design must be lightweight and durable.
- Device must be constructed within a \$50 budget.
- The design must withstand a 35mph wind ( blizzard conditions)
- Design must maintain current energy cost savings.