Element I – Score 1
Tree Ice Accumulation Prevention

EXAMPLES & RESOURCES

This entry would be likely to receive a score of 1, based on the EDPPSR. Two engineering educators who independently scored this portfolio each noted that the entry demonstrated minimal understanding of testing procedure and included no analysis of data. The entry provided evidence that a test was conducted to address one design requirement—that the device would prevent ice accumulation. However, there is no detail in the entry to make clear if or how prototype testing addressed the critical requirement that the device not damage trees.

The entry includes several photographs that show the placement of ice in relation to the cables of the prototype device. There are no labels or captions to help readers understand the purpose for inclusion of these photographs, although readers may infer that they illustrate testing over time. The entry also includes a data table with what appear to be measurements obtained over time, but the placement of time intervals in the last row—rather than in the first, affects ease of interpretation. Some text in the table ("Groups audience") is unclear and/or incomplete.

Because there is evidence that testing for one design requirement through physical modeling and gathering of resultant data has taken place, but analysis of that data is missing and visuals do not clearly support the data, a score of 1 is most appropriate.

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 I: Testing, data collection and analysis

5 Through the conduct of several tests for high priority requirements that are reasonable based on instructional contexts, or through physical or mathematical modeling, the student demonstrates considerable understanding of testing procedure, including the gathering and analysis of resultant data; the analysis of the effectiveness with which the design met stated goals includes a consistently detailed explanation [and summary] of the data from each portion of the testing procedure and from expert reviews, generously supported by pictures, graphs, charts and other visuals; the analysis includes an overall summary of the implications of all data for proceeding with the design and solving the problem.

4 Through the conduct of several tests for high priority requirements that are reasonable based on instructional contexts, or through physical or mathematical modeling, the student demonstrates ample understanding of testing procedure, including the gathering and analysis of resultant data; the analysis of the effectiveness with which the design met stated goals includes a generally detailed explanation [and summary] of the data from each portion of the testing procedure and from expert reviews, generally supported by pictures, graphs, charts and other visuals; the analysis includes an overall summary of the implications of most if not all of the data for proceeding with the design and solving the problem.

3 Through the conduct of a few tests for high priority requirements that are reasonable based on instructional contexts, or through physical or mathematical modeling, the student demonstrates adequate understanding of testing procedure, including the gathering and analysis of resultant data; the analysis of the effectiveness with which the design met stated goals includes a somewhat detailed explanation [and summary] of the data from each portion of the testing procedure and from expert reviews, at least somewhat supported by pictures, graphs, charts and other visuals; the analysis includes a summary of the implications of at least some of the data for proceeding with the design and solving the problem.

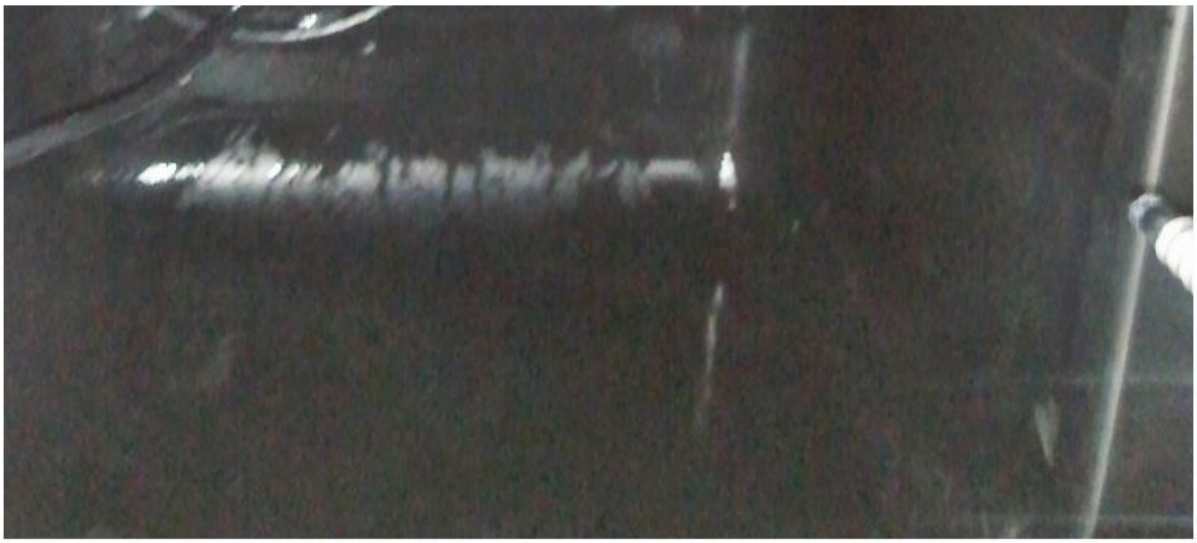
2 Through the conduct of one or two tests for high priority requirements that are reasonable based on instructional contexts, or through physical or mathematical modeling, the student demonstrates partial or overly general understanding of testing procedure, including the gathering and analysis of resultant data; the analysis of the effectiveness with which the design met stated goals includes a partial explanation [and summary] of the data (partially complete and/or partially correct), at least minimally supported by pictures, graphs, charts and other visuals; the analysis includes a partial and/or overly-general summary of the implications of at least some of the data for proceeding with the design and solving the problem.

1 Through the conduct of one or two tests for requirements (which may or may not be high priority) that are reasonable based on instructional contexts, or through physical or mathematical modeling, the student demonstrates minimal understanding of testing procedure, including the gathering and analysis of resultant data; the analysis of the effectiveness with which the design met stated goals includes an attempted explanation [and summary] of the data but may not be supported by any pictures, graphs, charts or other visuals; the analysis may be missing even a partial and/or overly-general summary of the implications of any of the data for proceeding with the design and solving the problem.

0 Any test(s) for requirement(s) or attempts at physical or mathematical modeling fail to demonstrate even minimal understanding of testing procedure, including the gathering and analysis of resultant data; OR there is no evidence of testing or physical or mathematical modeling to address any requirements.

Element I Reflective questions;
_ What did I/we learn from testing about how well this design met the stated design requirements?
_ Why should others believe my/our analysis of the data?

Tree Ice Accumulation Prevention Device



Temp of cable without ice (° C)	18°	39°	37°	39°	38°	38°	39°	40°	43°
Temp of cable with ice (°C)	-1°	5°	19°	18°	19°	18°	18°	20°	25°
Temp (°F)	64.4°	100.4°	98.6°	102.2°	100.4°	100.4°	102.2°	104°	109.4°
Temp with ice (° F)	30.2°	41°	57.2°	64.4°	66.2°	64.4°	64.4°	68°	77°
Time. (min)	0	5	10	15	20	25	30	35	40