

## Element D: Design concept generation, analysis, and selection

This entry received a **score of 1** based on the EDPPSR. The problem addressed by this design project is that those injured while hiking are unable to reach an evacuation point or medical assistance. The team's proposed design solution is a device that will convert from a trekking pole into a crutch if/when needed.

In this entry, team members presented a solution matrix in which several existing solutions and three new design options were compared. The entry includes a drawing of the proposed design and an image of the prototype (built in Autodesk Inventor). Missing, however, was any detailed evidence of the process for generating a possible design solution or evidence of an iterative process. While the students indicate that Design 2 ranked the highest," the basis upon which it was chosen as the solution is never made explicit.

The reviewers who scored this portfolio questioned the testability of the design requirements. Having clear, measurable and justified design requirements sets the stage for both choosing a "best" design and for being able to determine if a design can be tested. The results of that targeted and measurable testing then determine how well the design addresses the problem. Addressing these concerns would have easily led to a higher score on this element.

### 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 D: Design concept generation, analysis, and selection***

**5** The process for generating and comparing possible design solutions was comprehensive, iterative, and consistently defensible, making a viable and well-justified design highly likely; the design solution ultimately chosen was well-justified and demonstrated attention to all design requirements; the plan of action has considerable merit and would easily support repetition and testing for effectiveness by others.

**4** The process for generating and comparing possible design solutions was thorough, iterative, and generally defensible, making a viable design likely; the design solution chosen was justified and demonstrated attention to most if not all design requirements; the plan of action would support repetition and testing for effectiveness by others.

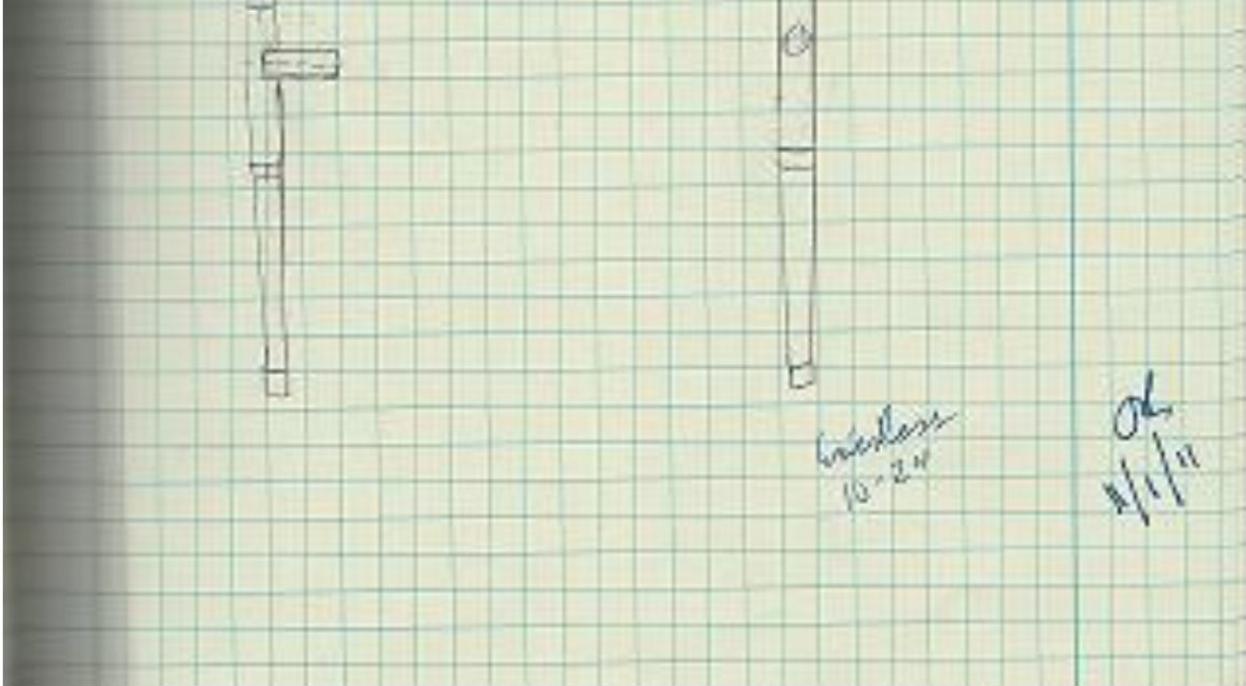
**3** The process for generating and comparing possible design solutions was adequate and generally iterative and defensible, making a viable design possible; the choice of design solution was explained with reference to at least some design requirements; the plan of action might not clearly or fully support repetition and testing for effectiveness by others.

**2** The process for generating a possible design solution was partial or overly general and only somewhat iterative and/or defensible, raising issues with the viability of the design solution chosen; that solution was not sufficiently explained with reference to design requirements; there is insufficient detail to allow for testing for replication of results.

**1** The process for generating a possible design solution was incomplete and was only minimally iterative and/or defensible; any attempted explanation for the design solution chosen lacked support related to design requirements and cannot be tested.

**0** There is no evidence an attempt to arrive at a design solution through an iterative process based on design requirements.





We then built a prototype of this model in Autodesk Inventor.

