

Element D: Design concept generation, analysis, and selection

This entry received a **score of 3** based on the EDPPSR. The expert reviewers who scored this portfolio found that the design matrix was defensible and that the design solution selected was explained adequately based on at least some of the design requirements. One noted that while it was unclear if the process for generating and comparing possible design solutions was iterative, it was very thorough.

Readers will note that design requirements, which were NOT prioritized in the entry for Element C in this portfolio, as they should have been, ARE prioritized here in the entry for Element D. Although scoring guidelines may include instructions to raters to return to and revise previous score decisions based on relevant evidence that appears elsewhere in the portfolio, it would be wise to encourage students to review the appropriate section of the rubric before finalizing any entry, to confirm that all evidence appears in the appropriate place in the portfolio. Readers cannot be counted upon to make connections across entries rather, it is up to the portfolio creator(s) to purposefully organize the artifacts and evidence included.

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.

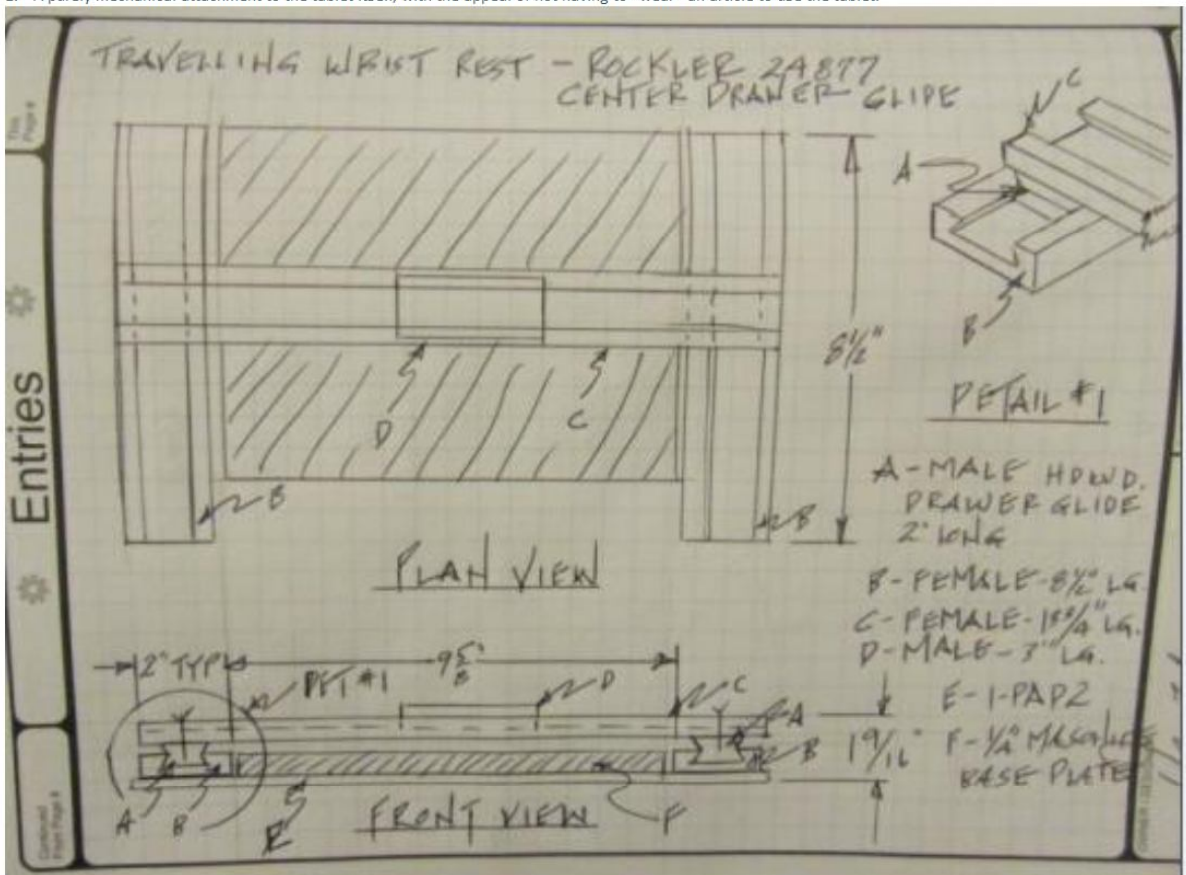
2 The process for generating a possible design solution was partial or overly general and only somewhat iterative and/or defensible, raising issues with the viability of the design solution chosen; that solution was not sufficiently explained with reference to design requirements; there is insufficient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

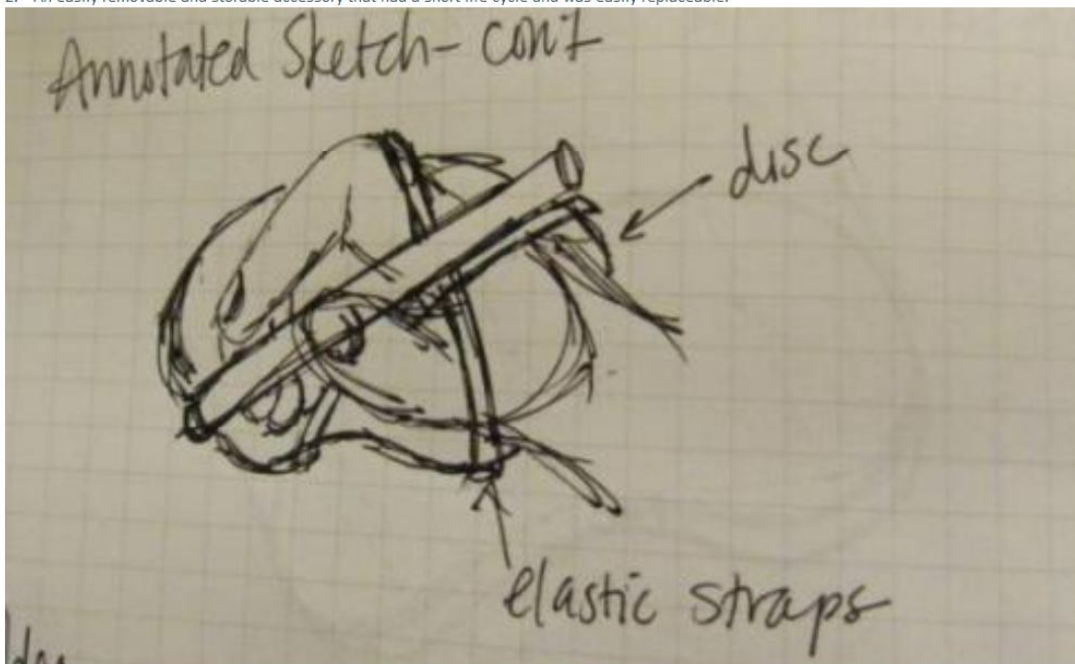
0 There is no evidence an attempt to arrive at a design solution through an iterative process based on design requirements.

The Stylus Relief design came from consideration of three distinct approaches:

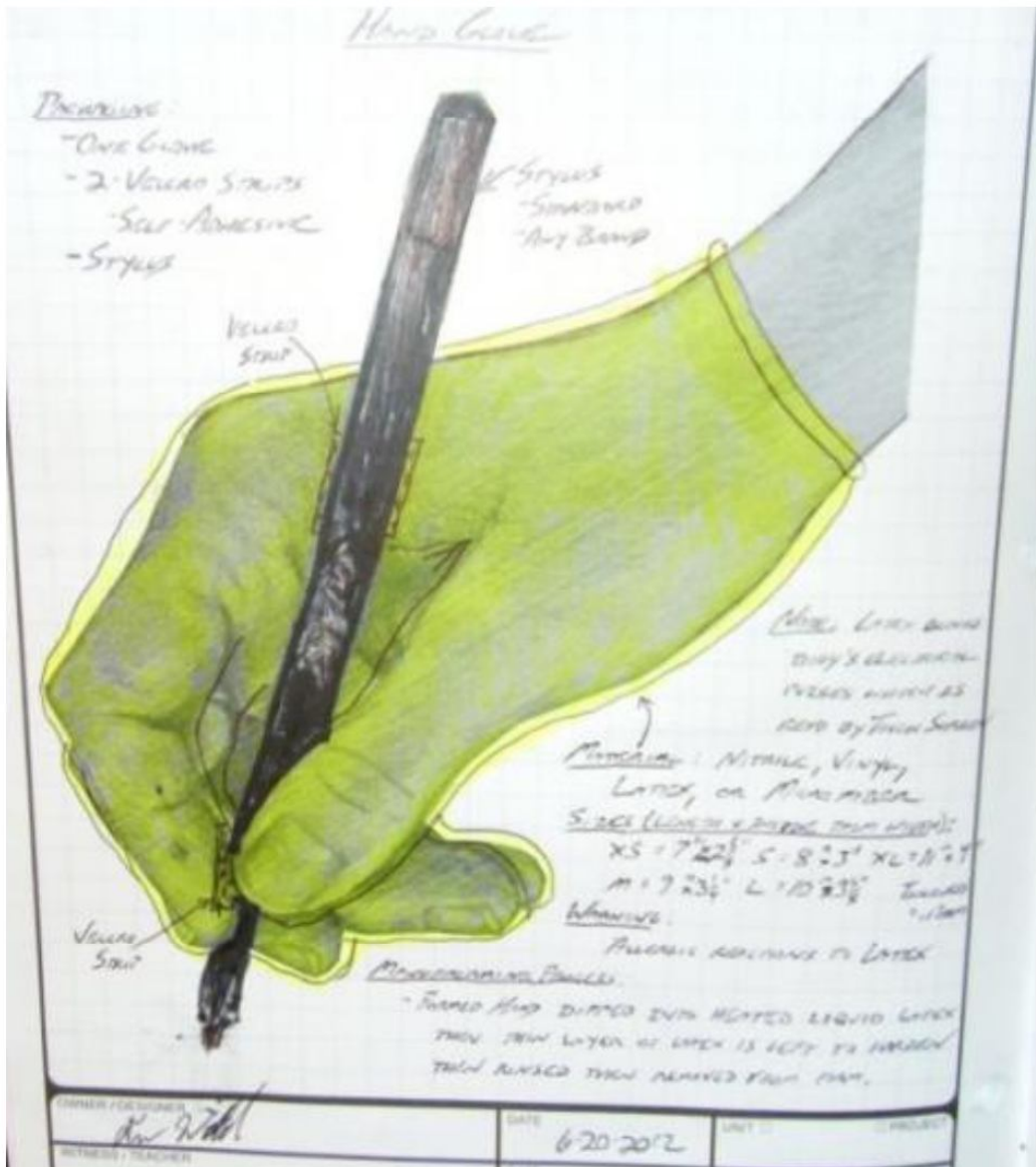
1. A purely mechanical attachment to the tablet itself, with the appeal of not having to "wear" an article to use the tablet.



2. An easily removable and storable accessory that had a short life cycle and was easily replaceable.



- A more intense "glove" based article which would be specifically configurable to the user.



In order of priority (greatest to least), the following criteria were used for deciding between the three options. The following items were considered high priority:

- Ease of use. Though highly subjective, the design had to be intuitive. It should be a product that could only be used incorrectly with great difficulty. It should be easily understood by the less than tech savvy person using a tablet for the first time.
- Associated with the above is the freedom of hand movement. This will be qualified during the Trade Show by polling the attendees about their opinions of the product.
- Non-interference with the functions of the tablet was a high priority. A component of this was the ability to access all points of the tablet screen which (from Google search) commonly are 8" x 10". This is a yes-no quantitative test.
- Portability and weight figured highly. It was determined that the product should weigh less than two ounces (57 grams) based upon the fact that the average stylus weighs less than an ounce. The size added to the tablet itself should be insignificant to allow the tablet to fit in existing cases.

Of lesser priority were the following:

- Cost. End users tend to be less concerned about cost if the product truly enhances their work experience. The price point was set at between ten dollars and twenty dollars based upon survey results showing the persons surveyed would pay an average of fifteen dollars.
- Adaptability to the size of the user's hand was important but not overriding. The product was designed with a certain degree of adjustability with the intent of two other models being produced for larger and smaller hands.
- As technology changes, so will the dimensions of future tablets. The product was designed with current tablets in mind, and the product must evolve to match changes in technology.

The least priority was assigned to the following categories:

- Aesthetics. Though the product is not displeasing to the eye, the rule of form following function was applied.
- Ergonomics. Though desirable, the basic configuration of the hand when writing is not intrinsically ergonomic, therefore value added would be minimal.
- Durability. The shelf life of the average cell phone is around one year, and tablets are projected to have a product life cycle of approximately two years. This product is considered disposable and economically replaceable.

In the final analysis of the attached decision matrix, it was determined that the most customer convenient and salable item would be the simple slip on hand attachment

Decision Matrix: Stylus Relief Design Options

PROBLEM: Many media tablet users all over the world enjoy using their device to take notes with a stylus. Users often complain that their palm gets in the way of the writing. It may either write where the user does not intend any writing to go or it may cause the	WEIGHT		Stylus Glider		Stylus Sandel		Stylus Glove		Glove-Sandel					
	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score
Specifications														
Cost (\$10-\$20)	3	1	3	12	4	12	4	12	3	9				
Easy to Use	4	3	12	4	16	3	12	3	12					
Different Hand Type Adaptability	3	4	12	3	9	2	6	2	6					
Full Screen Capability	4	2	8	4	16	4	16	4	16					
Non-Interference with Tablet Functions	4	3	12	4	16	4	16	4	16					
Freedom of Hand Movement	4	4	16	3	12	2	8	3	12					
Aesthetics	1	2	2	4	4	3	3	3	3					
Ergonomics	2	3	6	3	6	4	8	4	8					
Tablet Type Versatility	3	2	6	4	12	4	12	4	12					
Portability (Size/Weight)	4	1	4	4	16	4	16	4	16					
Durability	2	3	6	4	8	2	4	2	4					
TOTAL			87		127		113		114					

Scoring Key: Weight & Rating = 1 is low to 4 is high