



# TRAVEL MAGNETIC MAKEUP BRUSH STAND

Clancy Crawford

## ABSTRACT

A drawing package for my final project. As the assignment requires this document includes a cover page, statement of work, full assembly drawing, two subassembly drawings, and four part drawings that satisfy all required criteria.

Crawford, Clancy K.

EGR 120 Final Project Drawing Package

## Statement of Work

**Project Title:** Final Project – Travel Magnetic Makeup Brush Stand

**Prepared by:** Clancy Crawford

**Date:** 12/4/2024

**Instructor:** Sarah Griggs

**Course Name:** EGR120 - 14

**Institution:** Embry Riddle Aeronautical University

---

### 1. Project Overview

This final project involves utilizing the skills and knowledge acquired during this course to design and model a 3D object using CATIA software. The project aims to demonstrate proficiency in creating parts, assemblies, subassemblies, and technical drawings, as well as applying engineering principles and best practices in a real-world context.

The goal of this project is to provide first-hand experience of the engineering design process of a product by designing individual parts, assembling sub-components and main-components, improving components, and creating engineering documentation following industry-standards. This experience will be relevant in upper courses that require graphical design (e.g.: senior design projects), as well as in your professional career.

---

### 2. Objectives

The objectives of this project are as follows:

- **Identify** a product that would benefit from three-different improvements. You will spend the WHOLE semester working on this project, so select a product/topic that you are passionate about, ideally, related with your major.
- **Create** a brief description of the product that you selected, and provide some additional details such as total number of unique-parts, possible sub-assemblies, etc.
- **Create** a detail breakdown of your product by disassembling it down to the minor nuts and bolts. Document each part that will need to be modeled, identify how many of those parts are used in the assembly, and include a picture of each part.

- **Model** ALL parts that you identified on the previous step. You will still have the possibility to make minor changes to this parts after this submission in case of finding any errors through the assembly process.
- **Assemble** all modeled parts.
- **Create** a side-by-side comparison between your assembled product vs the real one. Explain the three modifications on your product and the reasoning behind it.
- **Create** the full engineering documentation of your product.

---

### 3. Scope of Work/Timeline

| TOPIC   | Suggested Due Date |
|---|--------------------|
| <a href="#">Next Steps 1 - Idea Generation</a>                                | 8/31               |
| <a href="#">Next Steps 2 - Group Formation and Finalized Idea</a>             | 9/7                |
| <a href="#">Next Steps 3 - Proposal</a>                                       | 9/14               |
| <a href="#">Next Steps 4 - Handsketches with dimensions</a>                   | 9/21               |
| <a href="#">Next Steps 5 - Part Planning</a>                                  | 9/28               |
| <a href="#">Next Steps 6- Part Modeling</a>                                   | 10/5               |
| <a href="#">Next Steps 7 - Drafting with Specialty views</a>                  | 10/12              |
| <a href="#">Next Steps 8 - Updated Assembly Tree</a>                          | 10/19              |
| <a href="#">Next Steps 9 - Advanced Part Modeling</a>                         | 10/26              |
| <a href="#">10 - Full Assembly</a> (Project Deliverable 1)                    | 11/2               |
| <a href="#">Next Steps 11 - Assembly Drawing (Draft)</a>                      | 11/9               |
| <a href="#">12 - Full Assembly with Modifications</a> (Project Deliverable 2) | 11/16              |
| <a href="#">13 - Photo Rendering</a> (Project Deliverable 3)                  | 11/23              |

|  |       |
|--|-------|
| <a href="#">14- Project Presentation (Project Deliverable 4)</a> | 11/30 |
| <a href="#">15 - Drawing Package (Project Deliverable 5)</a>     | 12/5  |

---

#### 4. Deliverables

The following deliverables will be provided at the end of the project:

1. **10 unique-parts.** A unique part is one that is replicated multiple times in an assembly (e.g.: even though a car has 4 wheels, this only counts as ONE unique part).
2. **Geometric complexity.** Your parts must have some geometric complexity beyond basic shapes (simple parts like boxes, and cylinders do not count).
3. **Realistic assembly.** You assembled product cannot have any interfering parts.
4. **Three modifications** to improve the product in any aspect.
5. **Full engineering documentation** that follow industry-standards introduced in class.

**Full Assembly:** A complete and functional assembly of the chosen component or assembly created using CATIA.

6. **Technical Drawings:** A set of technical drawings generated from the 3D model, including all necessary views, dimensions, and annotations.
7. **Final Report:** A comprehensive report that details the project planning, design process, challenges faced, and solutions implemented.
8. **Project Presentation:** A PowerPoint or similar presentation that summarizes the project, showcasing the 3D model and technical drawings.

---

#### 5. Resources and Tools

The following resources and tools will be used to complete the project:

- **Software:** CATIA Software

- **Additional Tools:** Microsoft Word (for report), Microsoft PowerPoint (for presentation), PDF viewer for document submission.
  - **Reference Materials:** Canvas, online resources, CATIA documentation.
- 

## 7. Performance and Evaluation Criteria

The project will be evaluated based on the following criteria:

1. **Completeness and Accuracy:** The 3D model and technical drawings should be complete, accurate, and adhere to design specifications.
  2. **Creativity and Innovation:** The design should demonstrate creativity and innovative use of CATIA's features.
  3. **Technical Quality:** The technical drawings should be clear, well-organized, and include all necessary details.
  4. **Documentation and Reporting:** The final report should be comprehensive, well-written, and clearly explain the design process.
  5. **Presentation:** The final presentation should be professional, engaging, and effectively communicate the project's key aspects.
- 

### Prepared by:

Clancy Crawford

12/4/2024

Bill of Material: Product4

| Number | Quantity | Part Number                                   | Type     |
|--------|----------|---|----------|
|        | 1        | Product3                                      | Assembly |
|        | 1        | CRAWFORD_BRUSH HOLDER_ASSEMBLY                | Assembly |
| 1      | 1        | CRAWFORD_BRUSH_STRAPS                         | Part     |
| 2      | 1        | CRAWFORD_VELCROABLE_POCKETS                   | Part     |
| 3      | 1        | CRAWFORD_DESK_ATTACHMENT                      | Part     |
| 4      | 2        | 90357A150_Ultra-Low-Profile Socket Head Screw | Part     |

Bill of Material: Product3

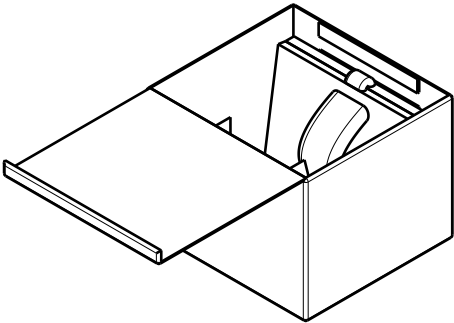
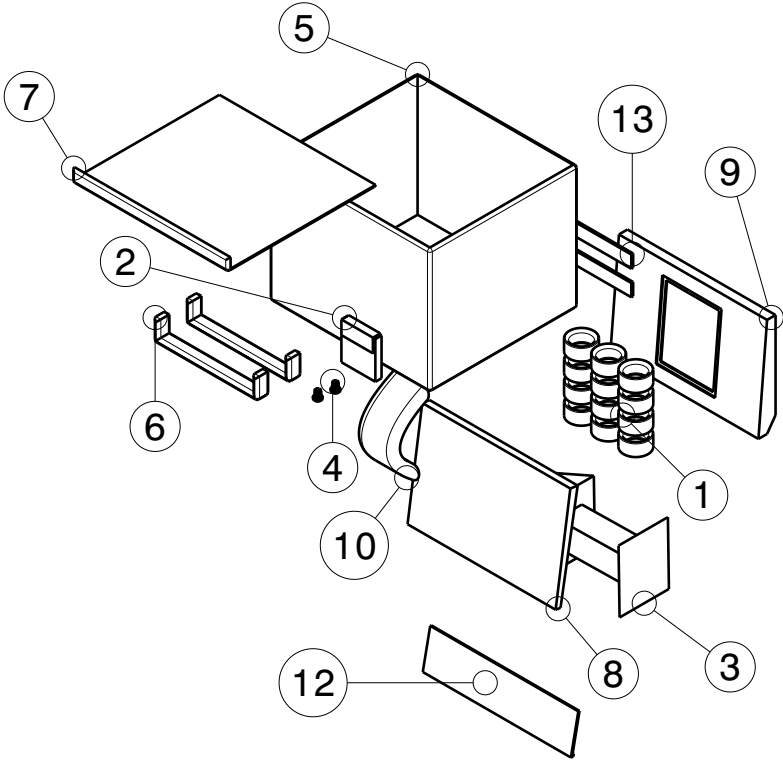
| Number | Quantity | Part Number                  | Type |
|--------|----------|------------------------------|------|
| 5      | 1        | CRAWFORD_TRAVEL_CASE         | Part |
| 6      | 1        | CRAWFORD_TRAVEL_CASE_HANDLES | Part |
| 7      | 1        | CRAWFORD_TRAVEL_CASE_LID     | Part |

Bill of Material: CRAWFORD\_BRUSH HOLDER\_ASSEMBLY

| Number | Quantity | Part Number                                    | Type |
|--------|----------|--|------|
| 8      | 1        | CRAWFORD_BRUSH HOLDER                          | Part |
| 9      | 1        | CRAWFORD_EXTENDED_BRUSH HOLDER                 | Part |
| 10     | 1        | CRAWFORD_BRUSH HOLDER_CARRYING_STRAP           | Part |
| 11     | 1        | CRAWFORD_MECHANISM_FOR_CLOSING_FOR_BRUSH_STAND | Part |
| 12     | 1        | CRAWFORD_BRUSH_FLAP                            | Part |

Bill of Material: CRAWFORD\_BRUSH HOLDER\_ASSEMBLY

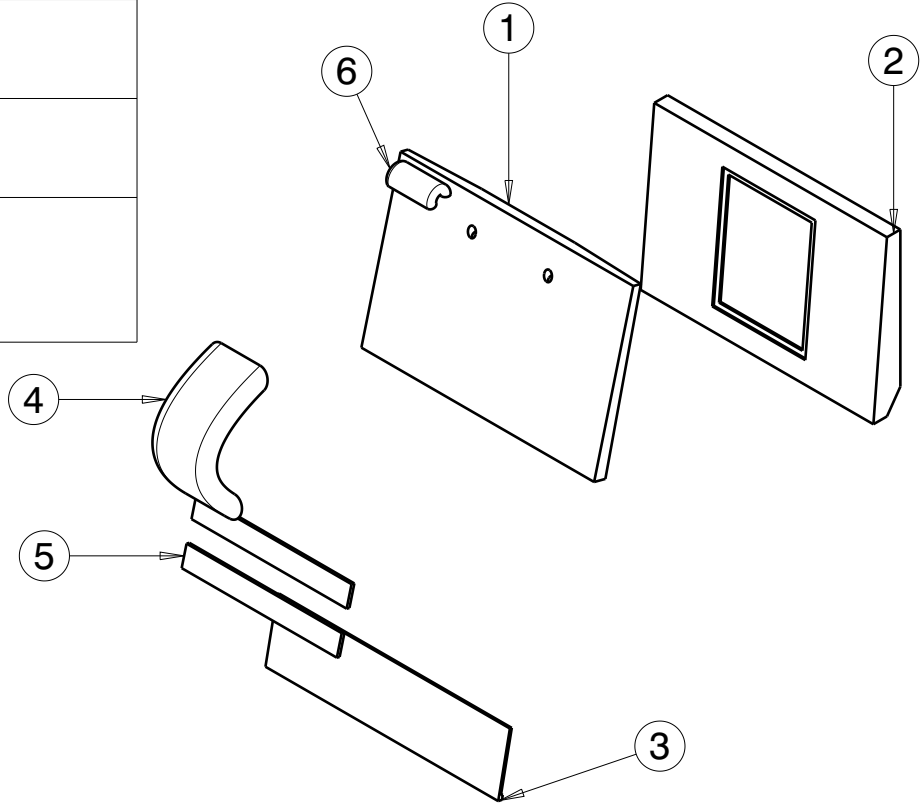
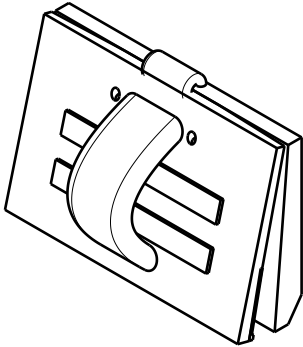
| Number | Quantity | Part Number               | Type |
|--------|----------|---------------------------|------|
| 13     | 1        | CRAWFORD_MAGNETIC_HOLDERS | Part |



|   |                        |   |                    |                  |
|---|------------------------|---|--------------------|------------------|
| DIMENSION TOLERANCE<br><br>DECIMAL:<br>.XX ± .03<br>.XXX ± .005<br><br>ANGULAR:<br>± 1° | DRAWN BY: CRAWFORD, C. | EMBRY-RIDDLE AERONAUTICAL UNIVERSITY<br>AEROSPACE ENGINEERING |                    |                  |
|   | APPROVED BY: LAST, F.  |   |                    |                  |
|   | MODELED BY: LAST, F.   | DRAWING TITLE:<br>TRAVEL MAGNETIC MAKEUP<br>STAND ASSEMBLY    |                    |                  |
|   | LAST, F.               | SCALE:<br>1:11  | DATE:<br>11/9/2024 | SHEET:<br>1 of 1 |

Bill of Material: Product1

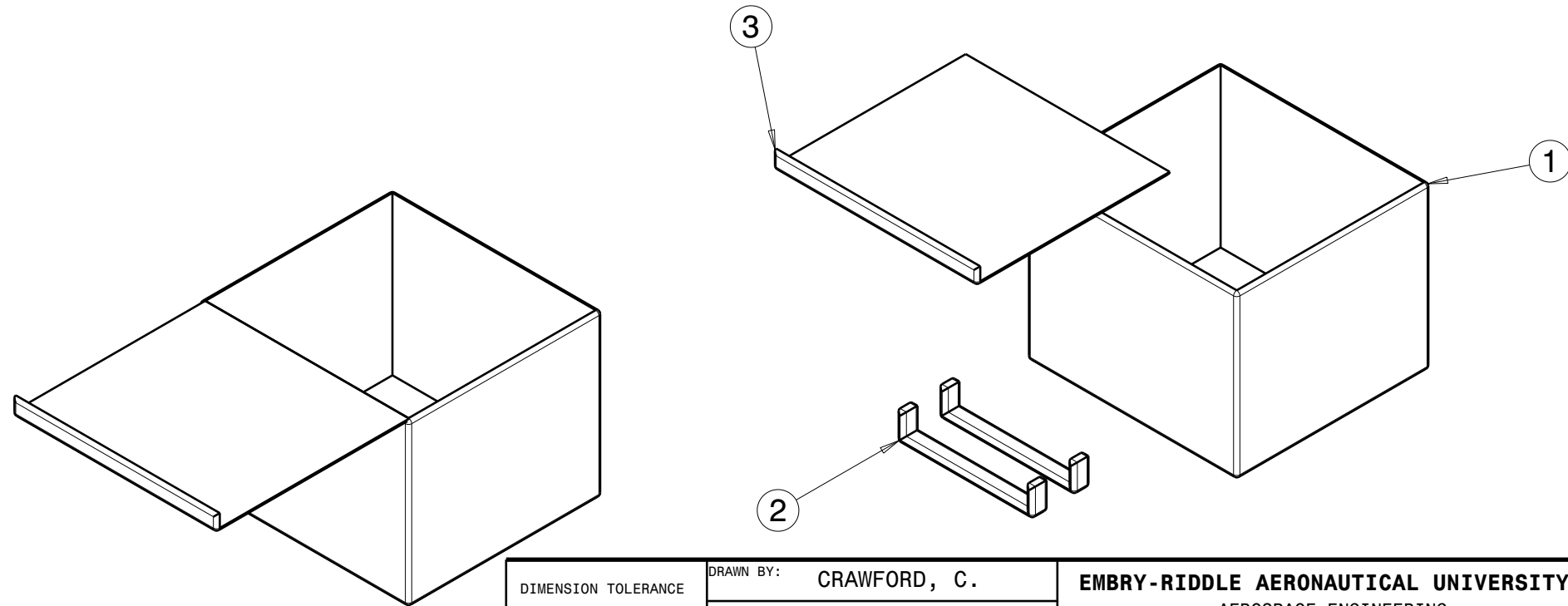
| Number | Quantity | Part Number  | Type |
|--------|----------|--|------|
| 1      | 1        | CRAWFORD_BRUSH_HOLDE<br>R                              | Part |
| 2      | 1        | CRAWFORD_EXTENDED_BR<br>USH HOLDER                     | Part |
| 3      | 1        | CRAWFORD_BRUSH_FLAP                                    | Part |
| 4      | 1        | CRAWFORD_BRUSH_HOLDE<br>R_CARRYING_STRAP               | Part |
| 5      | 1        | CRAWFORD_MAGNETIC_HO<br>LDERS                          | Part |
| 6      | 1        | CRAWFORD_MECHANISM_F<br>OR_CLOSING_FOR_BRUSH<br>_STAND | Part |



|                                      |                        |   |                    |                  |
|--------------------------------------|------------------------|---|--------------------|------------------|
| DIMENSION TOLERANCE                  | DRAWN BY: CRAWFORD, C. | EMBRY-RIDDLE AERONAUTICAL UNIVERSITY<br>AEROSPACE ENGINEERING |                    |                  |
|                                      | APPROVED BY: LAST, F.  |   |                    |                  |
| DECIMAL:<br>.XX ± .03<br>.XXX ± .005 | MODELED BY: LAST, F.   | DRAWING TITLE:<br>BRUSH HOLDER SUBASSEMBLY                    |                    |                  |
|                                      | LAST, F.               |   |                    |                  |
| ANGULAR:<br>± 1°                     |                        | SCALE:<br>1:7   | DATE:<br>12/4/2024 | SHEET:<br>1 of 1 |

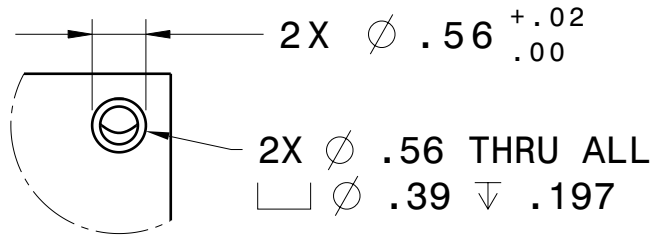
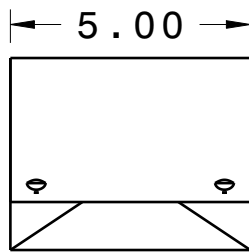
Bill of Material: Product1

| Number | Quantity | Part Number                      | Type |
|--------|----------|----------------------------------|------|
| 1      | 1        | CRAWFORD_TRAVEL_CASE             | Part |
| 2      | 1        | CRAWFORD_TRAVEL_CASE<br>_HANDLES | Part |
| 3      | 1        | CRAWFORD_TRAVEL_CASE<br>_LID     | Part |

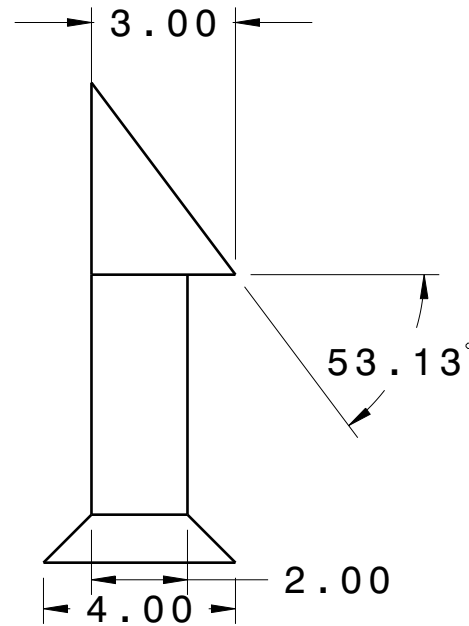
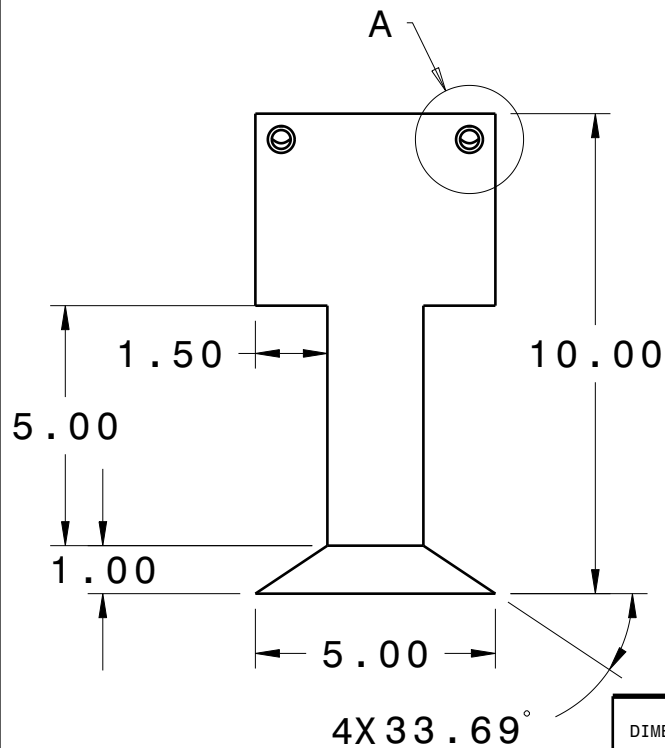
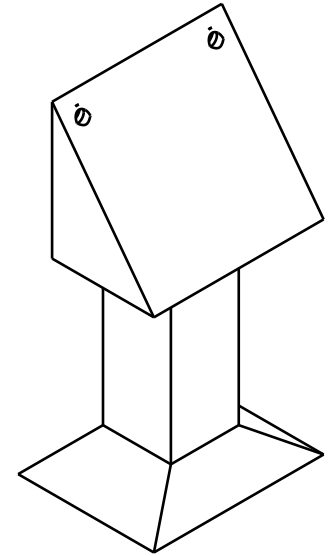


|                                      |                        |   |                    |                  |
|--------------------------------------|------------------------|---|--------------------|------------------|
| DIMENSION TOLERANCE                  | DRAWN BY: CRAWFORD, C. | EMBRY-RIDDLE AERONAUTICAL UNIVERSITY<br>AEROSPACE ENGINEERING |                    |                  |
|                                      | APPROVED BY: LAST, F.  |   |                    |                  |
|                                      | MODELED BY: LAST, F.   | DRAWING TITLE:<br>TRAVEL CASE ASSEMBLY                        |                    |                  |
|                                      | LAST, F.               |   |                    |                  |
| DECIMAL:<br>.XX ± .03<br>.XXX ± .005 |                        | SCALE:<br>1:7   | DATE:<br>12/4/2024 | SHEET:<br>1 of 1 |
| ANGULAR:<br>± 1°                     |                        |   |                    |                  |



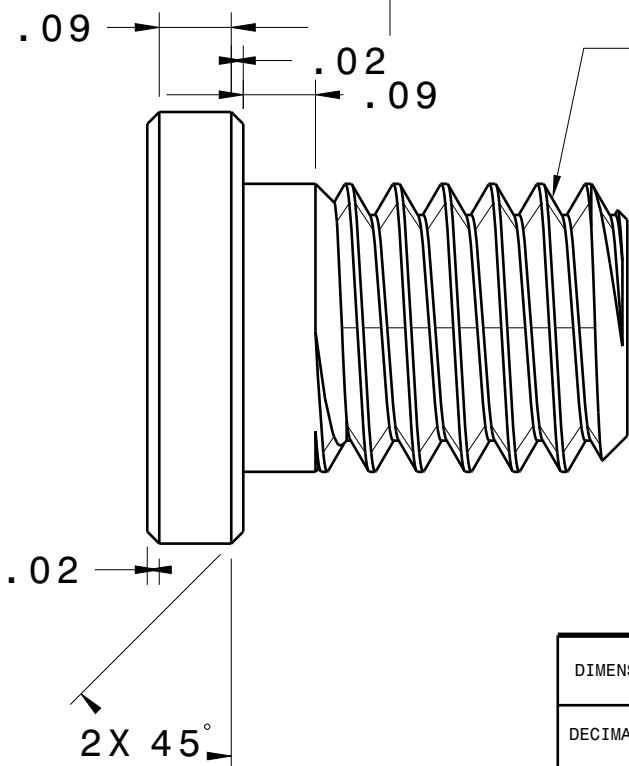
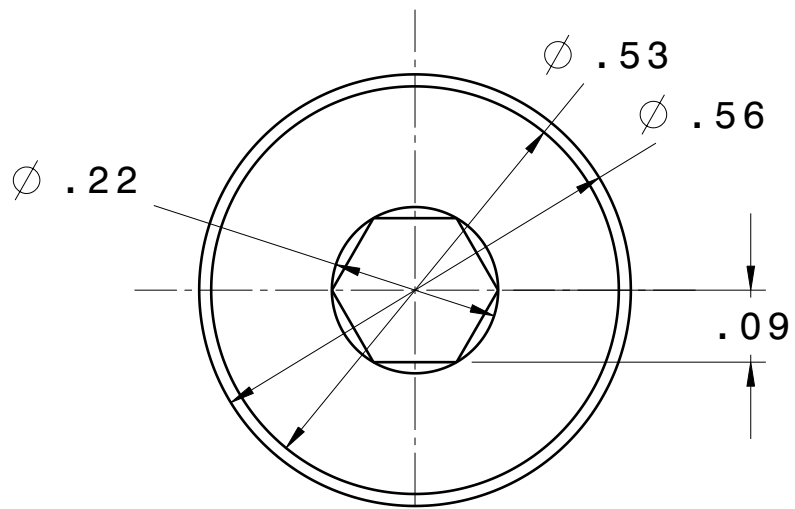


Detail A  
Scale: 1:2

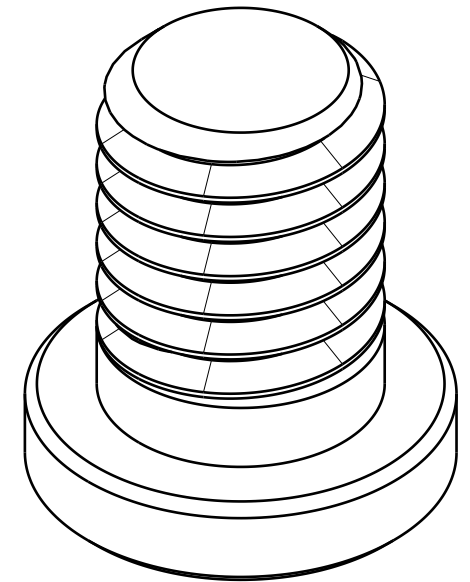


NOTE: TOLERANCE = CLASS FT2  
FROM THE ANSI FIT TABLES

|   |                        |   |                 |               |
|---|------------------------|---|-----------------|---------------|
| DIMENSION TOLERANCE<br><br>DECIMAL:<br>.XX ± .03<br>.XXX ± .005<br><br>ANGULAR:<br>± 1° | DRAWN BY: CRAWFORD, C. | EMBRY-RIDDLE AERONAUTICAL UNIVERSITY<br>AEROSPACE ENGINEERING |                 |               |
|   | APPROVED BY: LAST, F.  |   |                 |               |
|   | MODELED BY: LAST, F.   | DRAWING TITLE:<br>DESK ATTACHMENT PART                        |                 |               |
|   | LAST, F.               |   |                 |               |
|   |                        | SCALE: 1:4  | DATE: 12/4/2024 | SHEET: 1 of 1 |

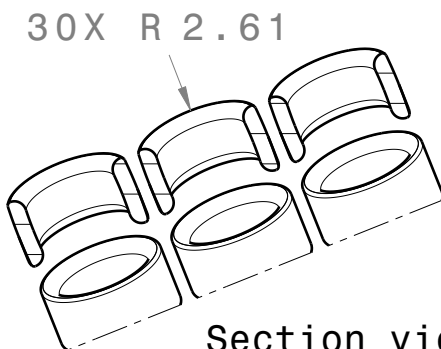
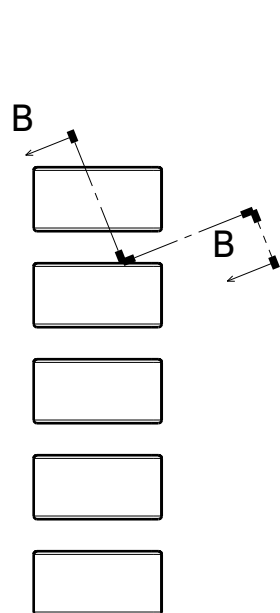
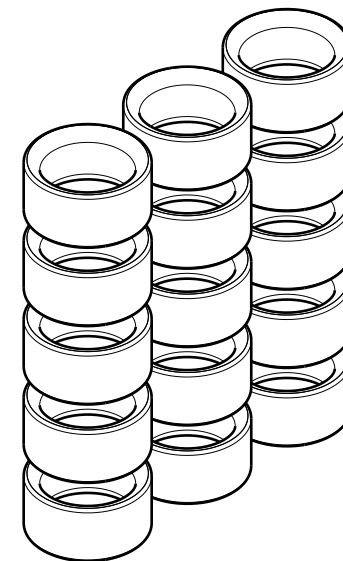
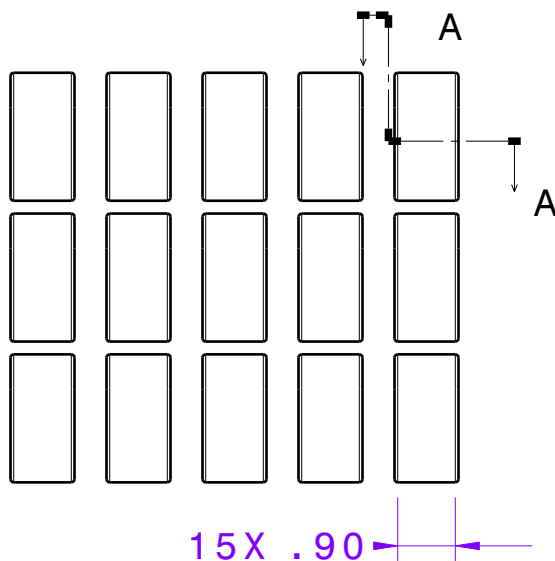
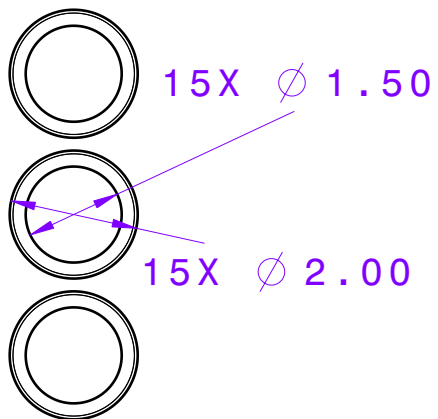


1/2" -16 UNC 3A RH  $\pm 0.005$

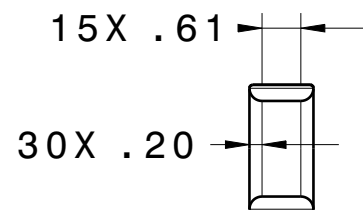


NOTE: THIS SCREW IS #90357A150 ON MCMASTER.COM  
THE VALUES GIVEN ARE DIRECTLY FROM THE WEBSITE  
INCLUDING THE TOLERANCE.

|  |                        |  |                 |               |
|--|------------------------|--|-----------------|---------------|
| DIMENSION TOLERANCE<br><br>DECIMAL:<br>.XX $\pm .03$<br>.XXX $\pm .005$<br><br>ANGULAR:<br>$\pm 1^\circ$ | DRAWN BY: CRAWFORD, C. | <b>EMBRY-RIDDLE AERONAUTICAL UNIVERSITY</b><br>AEROSPACE ENGINEERING |                 |               |
|  | APPROVED BY: LAST, F.  |  |                 |               |
|  | MODELED BY: LAST, F.   | DRAWING TITLE:<br><b>SCREW PART</b>                                  |                 |               |
|  | LAST, F.               |  |                 |               |
|  |                        | SCALE: 4:1   | DATE: 12/4/2024 | SHEET: 1 of 1 |

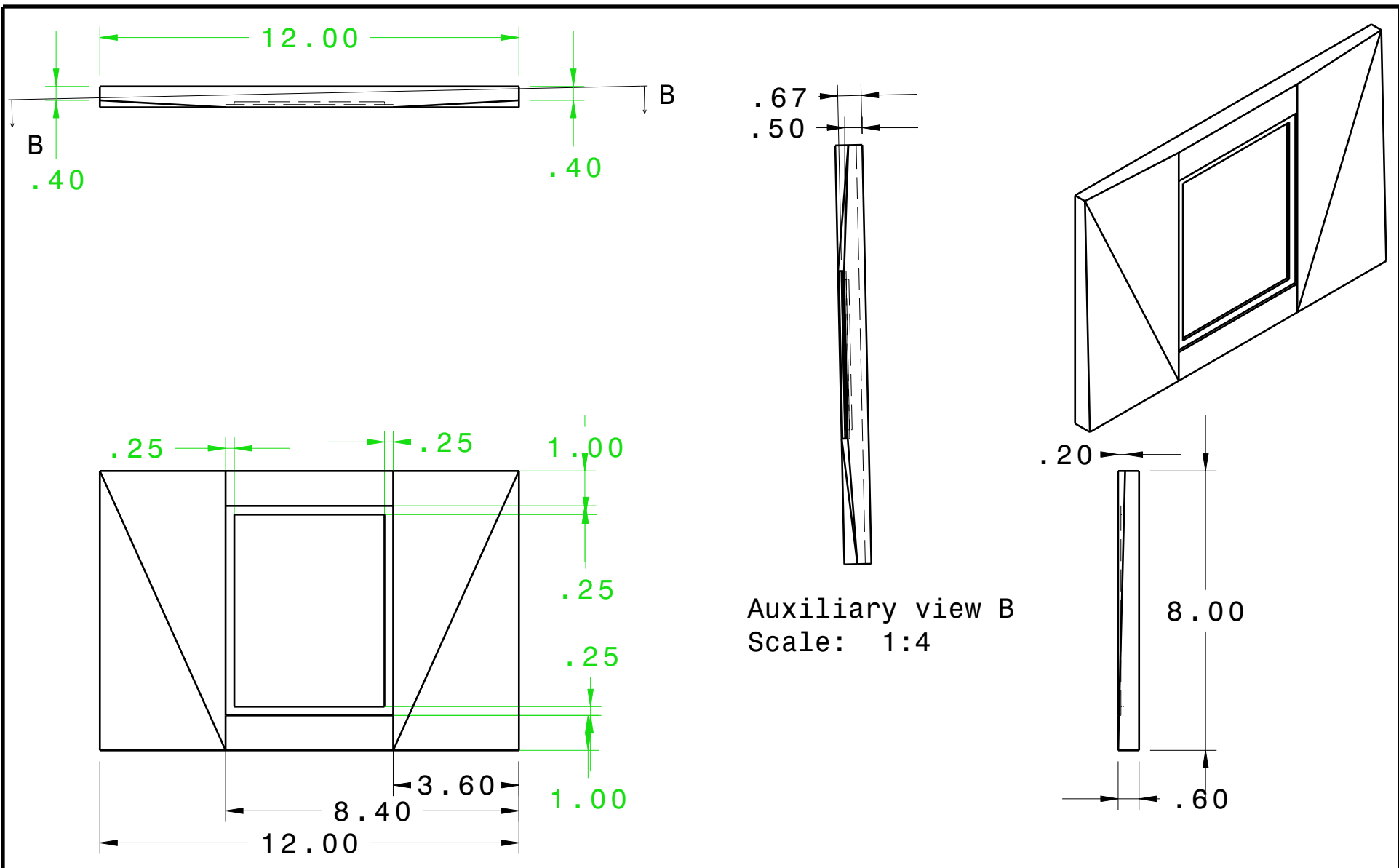


Section view B-B  
Scale: 1:3



Section view A-A  
Scale: 1:3

|   |                        |  |                 |
|---|------------------------|--|-----------------|
| DIMENSION TOLERANCE<br><br>DECIMAL:<br>.XX ± .03<br>.XXX ± .005<br><br>ANGULAR:<br>± 1° | DRAWN BY: CRAWFORD, C. | <b>EMBRY-RIDDLE AERONAUTICAL UNIVERSITY</b><br>AEROSPACE ENGINEERING |                 |
|   | APPROVED BY: LAST, F.  |  |                 |
|   | MODELED BY: LAST, F.   | DRAWING TITLE:<br><b>BRUSH STRAPS</b>                                |                 |
|   | LAST, F.               |  |                 |
|   |                        | SCALE: 1:3   | DATE: 12/4/2024 |
|   |                        |  | SHEET: 1 of 1   |



|                                      |                       |   |                     |                |
|--------------------------------------|-----------------------|---|---------------------|----------------|
| DIMENSION TOLERANCE                  | DRAWN BY: CRAWFORD, C | EMBRY-RIDDLE AERONAUTICAL UNIVERSITY<br>AEROSPACE ENGINEERING |                     |                |
|                                      | APPROVED BY: LAST, F. |   |                     |                |
|                                      | MODELED BY: LAST, F.  | DRAWING TITLE:<br>NEXT STEPS 7: BRUSH HOLDER                  |                     |                |
|                                      | LAST, F.              |   |                     |                |
| DECIMAL:<br>.XX ± .03<br>.XXX ± .005 |                       | SCALE:<br>1:4   | DATE:<br>10/12/2024 | SHEET:<br>of 1 |
| ANGULAR:<br>± 1°                     |                       |   |                     |                |