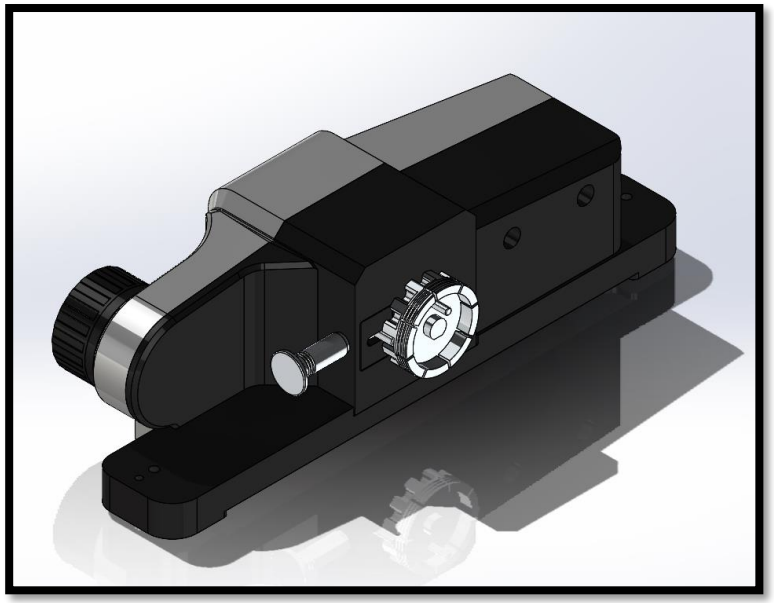
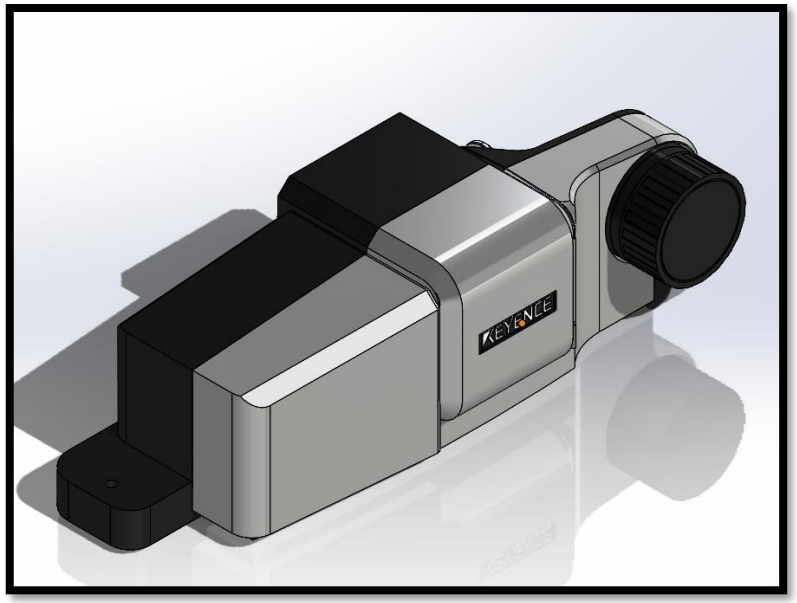
Engineering Portfolio

Maxwell Willix

Maxwell Willix | General Dynamics Ordnance and Tactical Systems Internship (May 2024 – December 2024)

Project Objective: Use SolidWorks to create 3D models of a Keyence IM-RU1 coordinate measuring machine for work holdings to be prototyped.



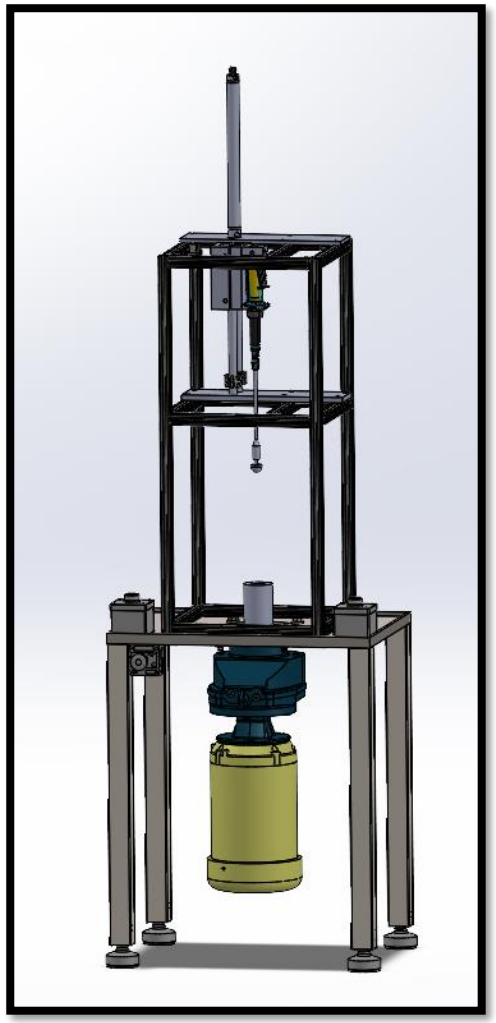


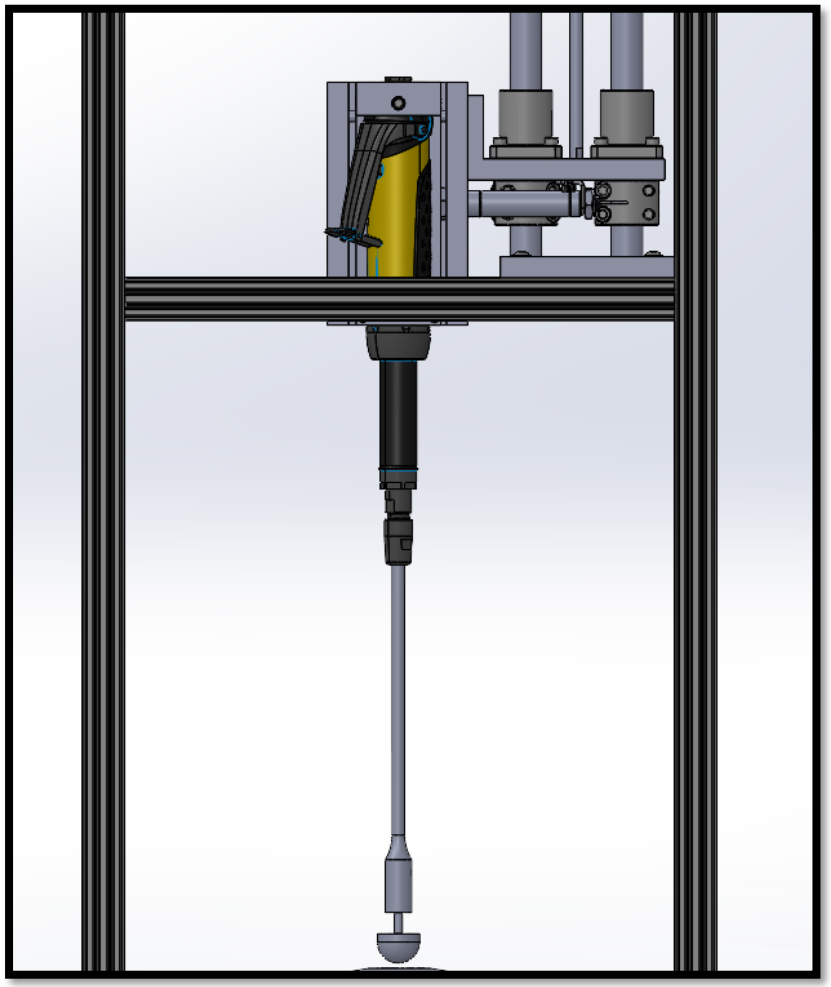
Maxwell Willix | Modular Fairing for Road Bikes (Senior Design)

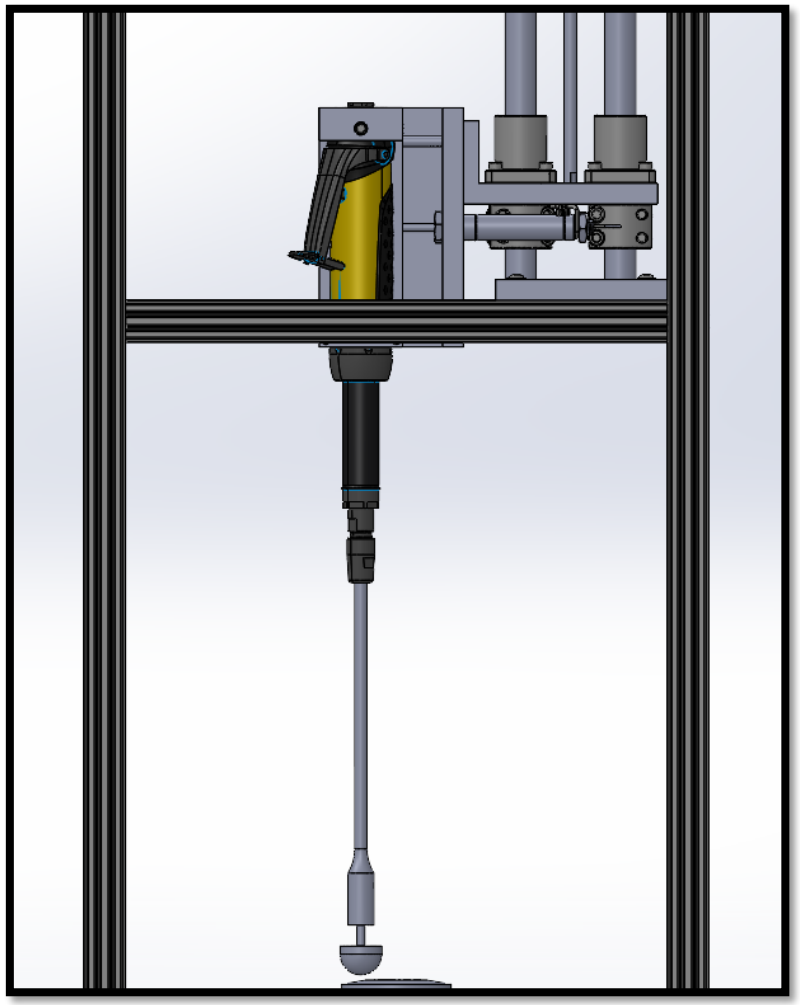
Project Objective: Design, build, and test a product that improves the aerodynamic performance of shallow section road bike wheels that can be easily installed and removed.

Maxwell Willix | General Dynamics Ordnance and Tactical Systems Internship (May 2024 – December 2024)

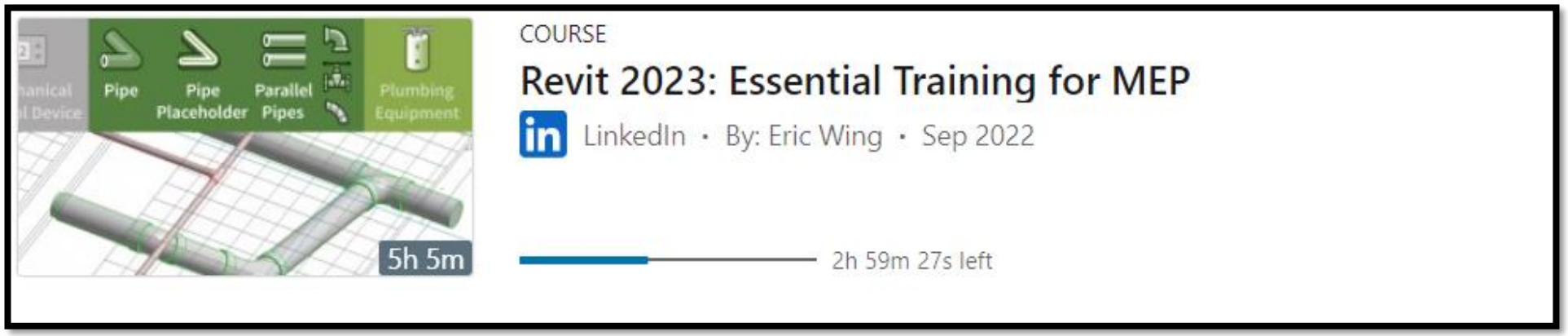
Project Objective: Design an automated deburring machine that increases efficiency and eliminates safety hazards associated with manual operation.

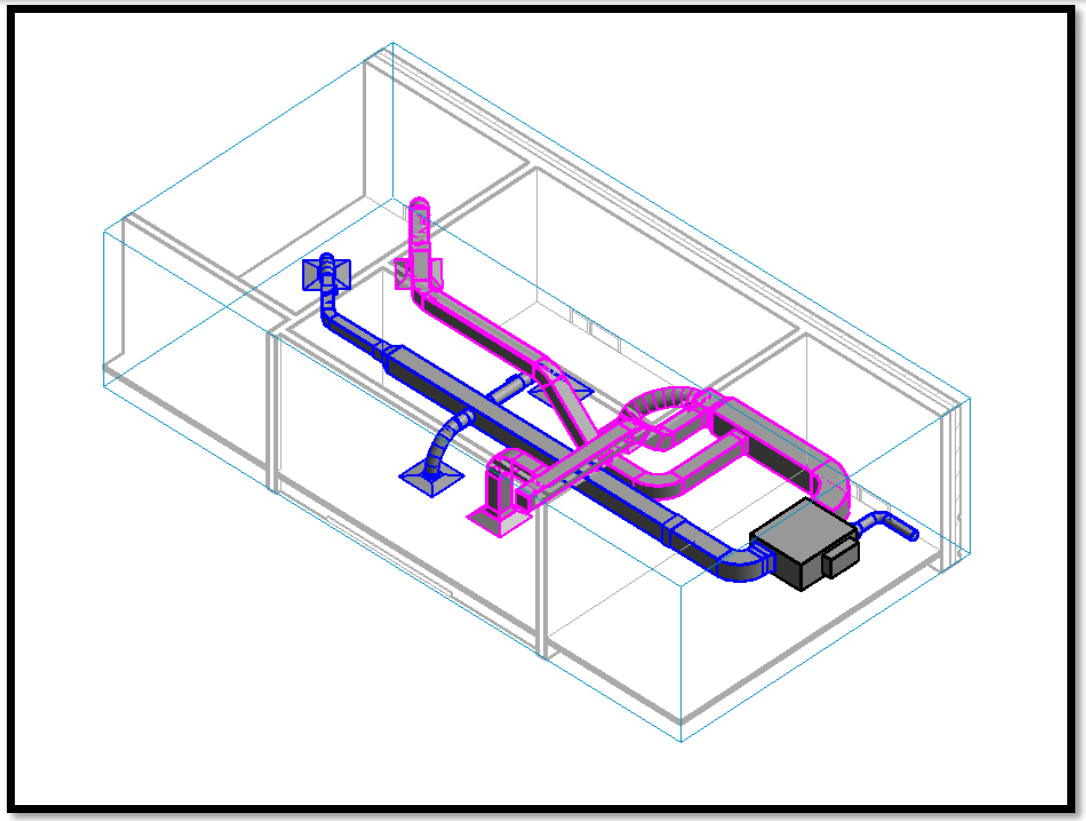






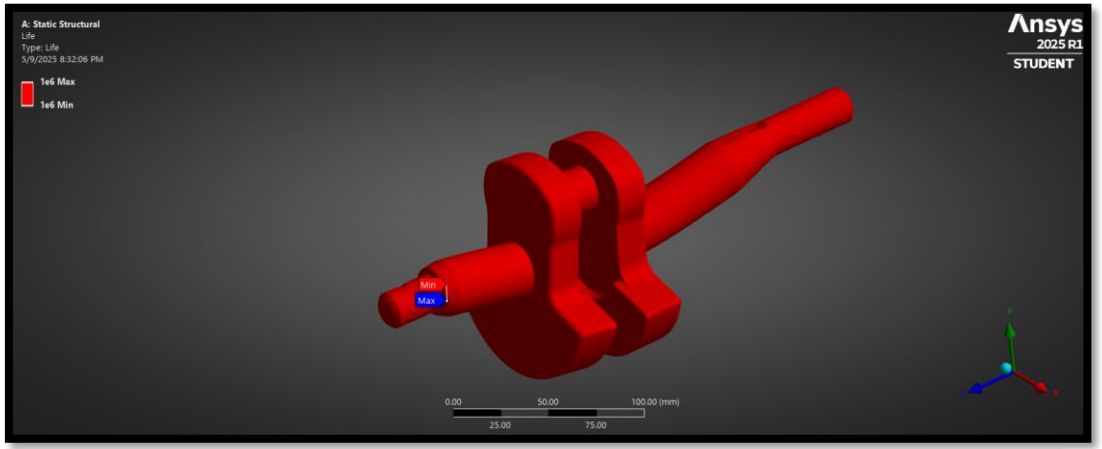
Maxwell Willix | Introductory Revit Course (Voluntarily Enrolled)

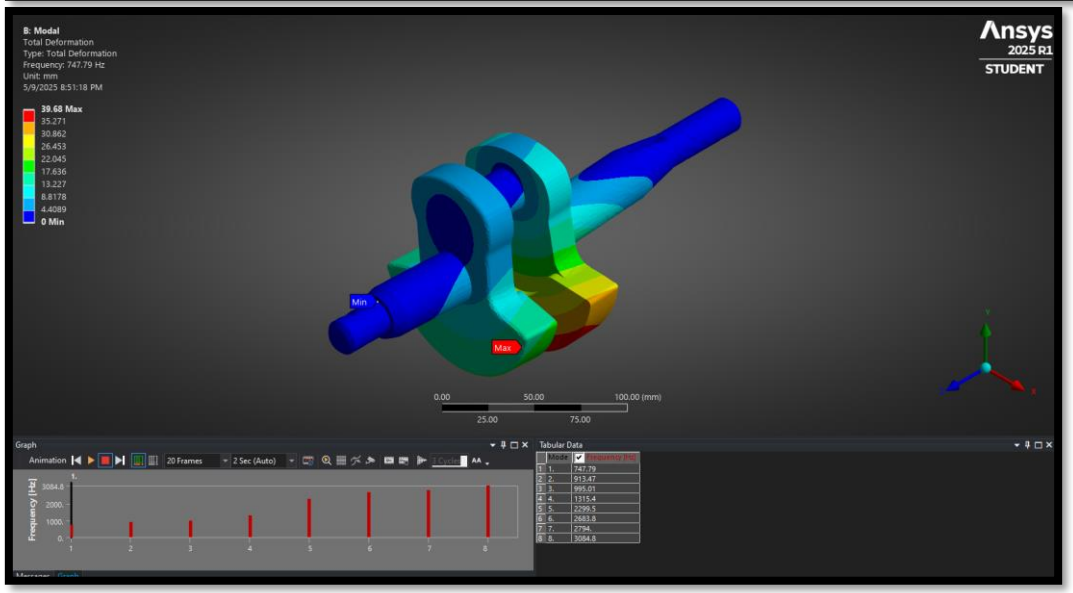


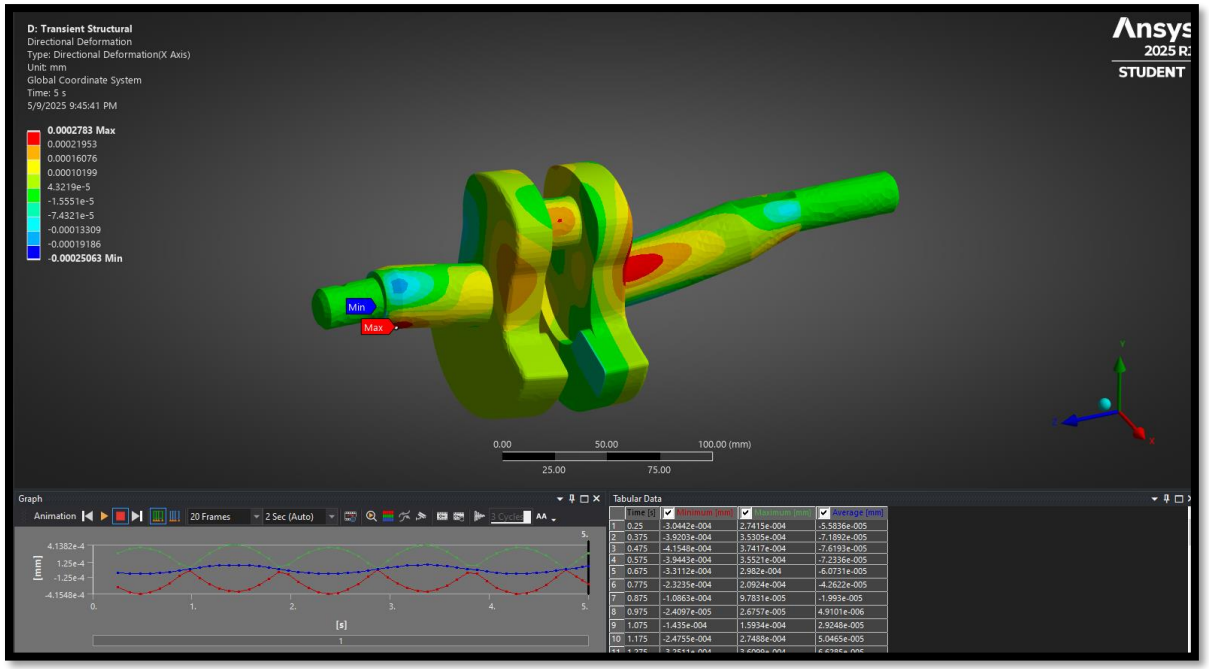


Maxwell Willix | ANSYS Simulation of a Single Cylinder Engine Crank Shaft

Project Objective: Use ANSYS to perform fatigue, modal, harmonic, and transient analyses on a single-cylinder engine crankshaft, and demonstrated infinite fatigue life using Goodman criteria.

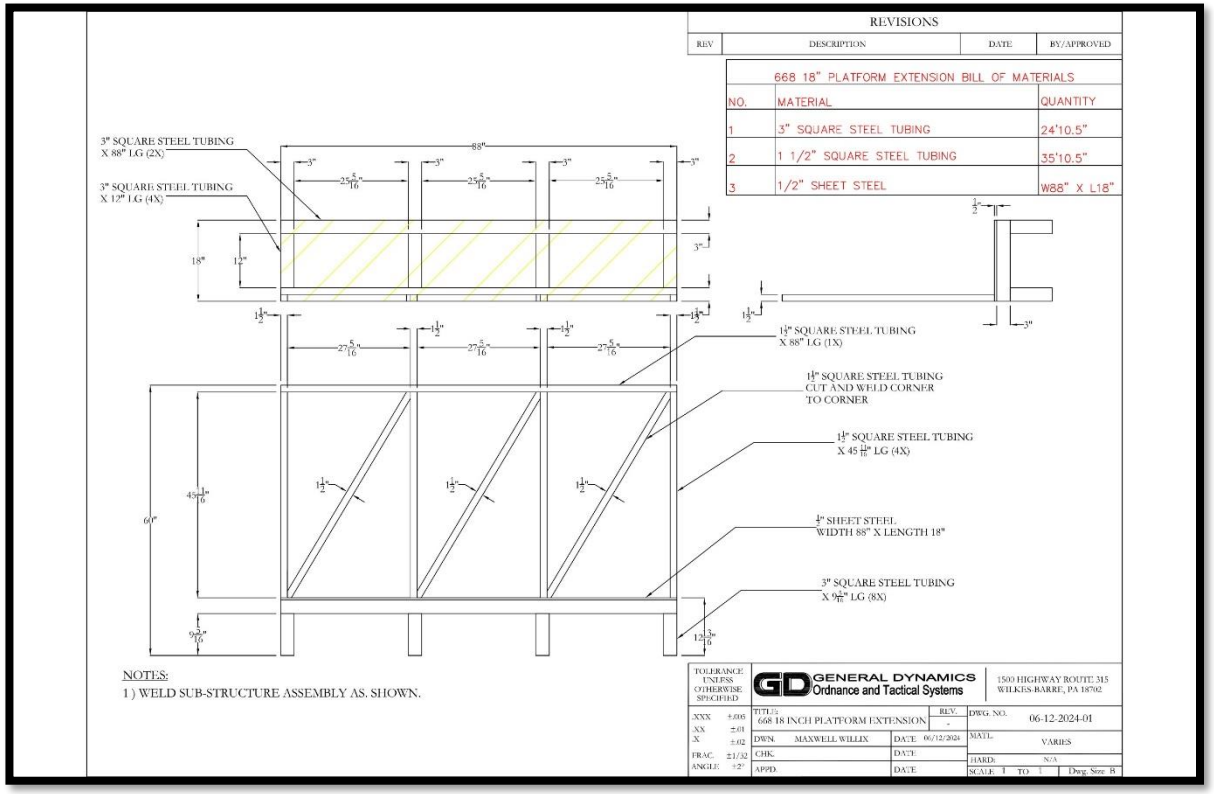


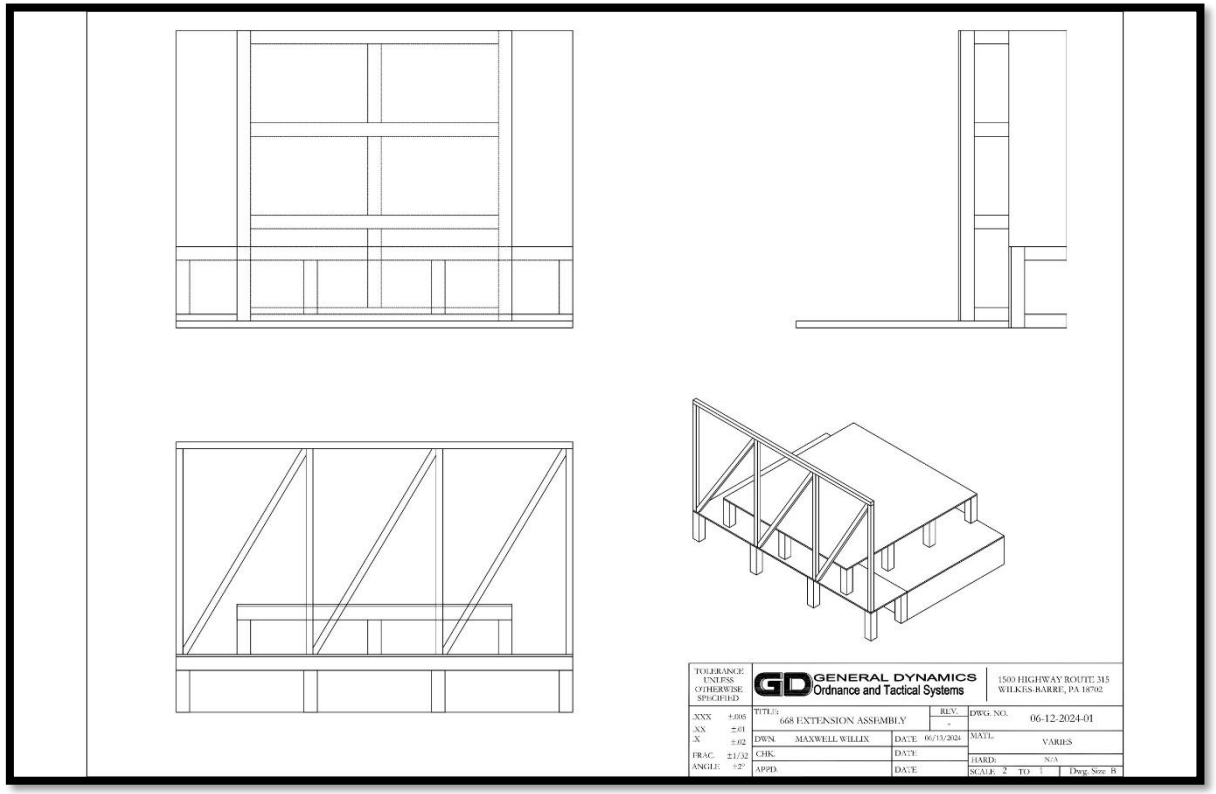




Maxwell Willix | General Dynamics Ordnance and Tactical Systems Internship (May 2024 – December 2024)

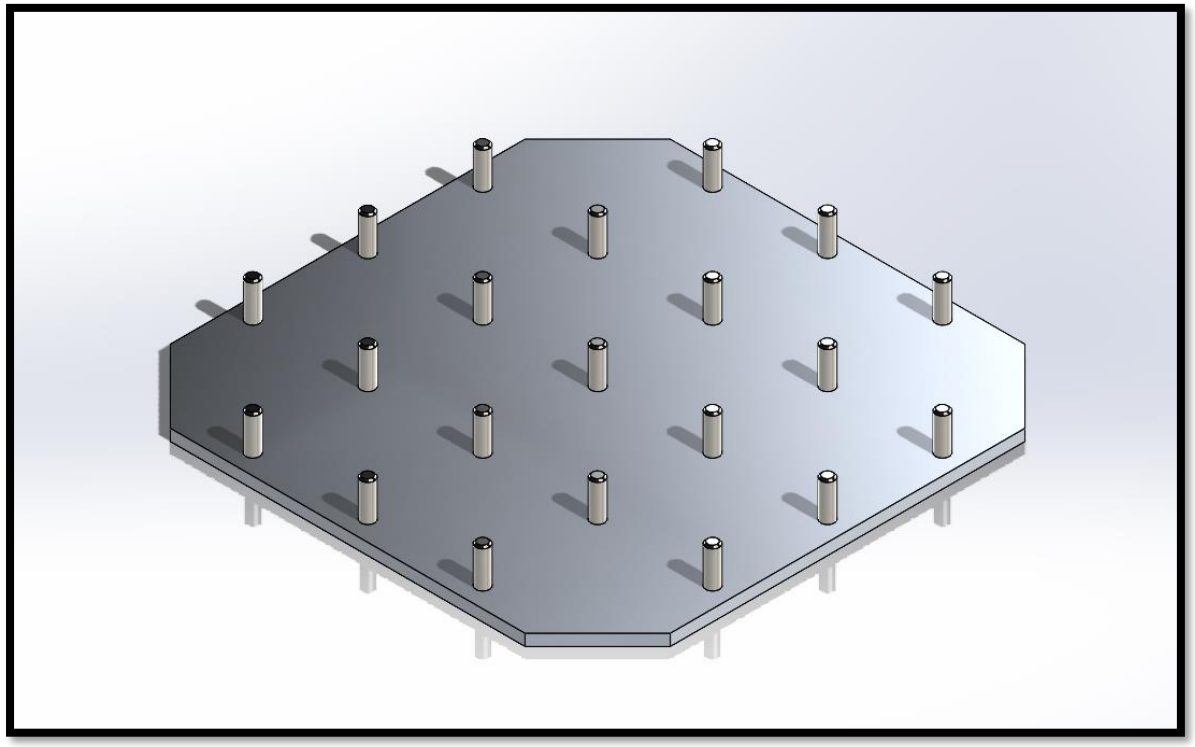
Project Objective: Design a two-level loading platform for a Roto-blast machine that includes a safety rail and an ergonomic workspace.

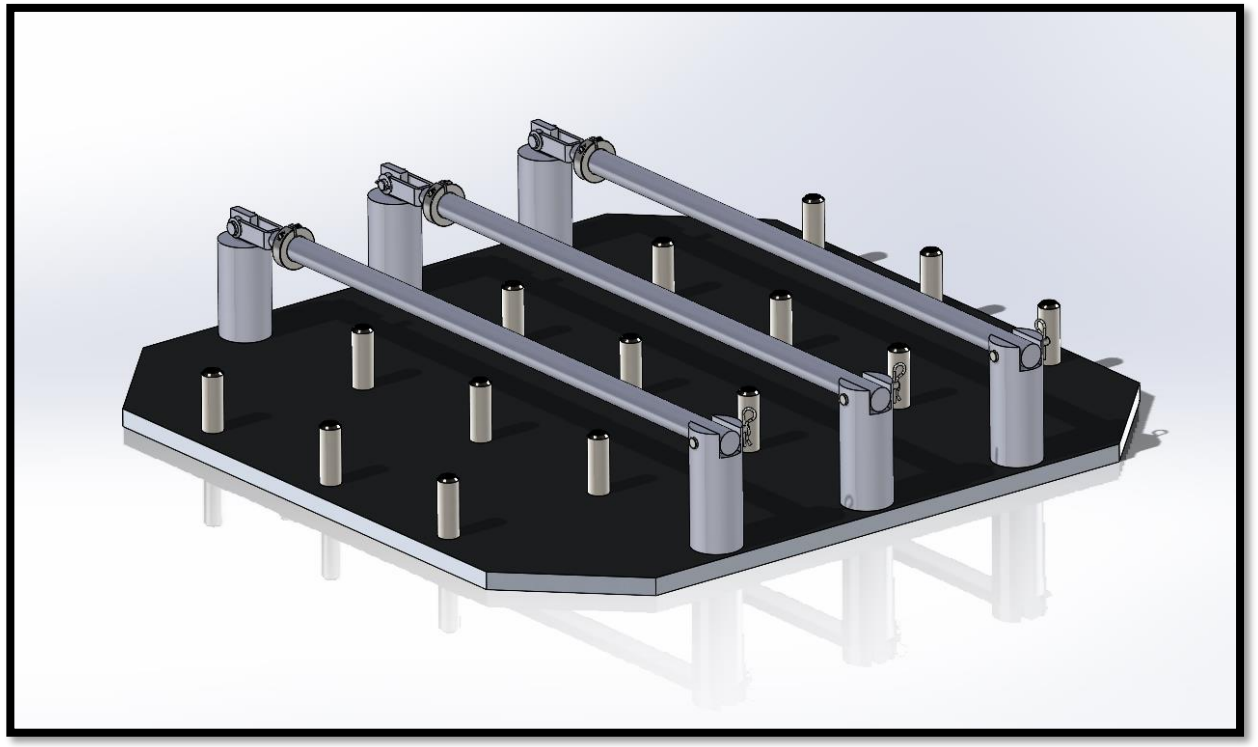




Maxwell Willix | General Dynamics Ordnance and Tactical Systems Internship (May 2024 – December 2024)

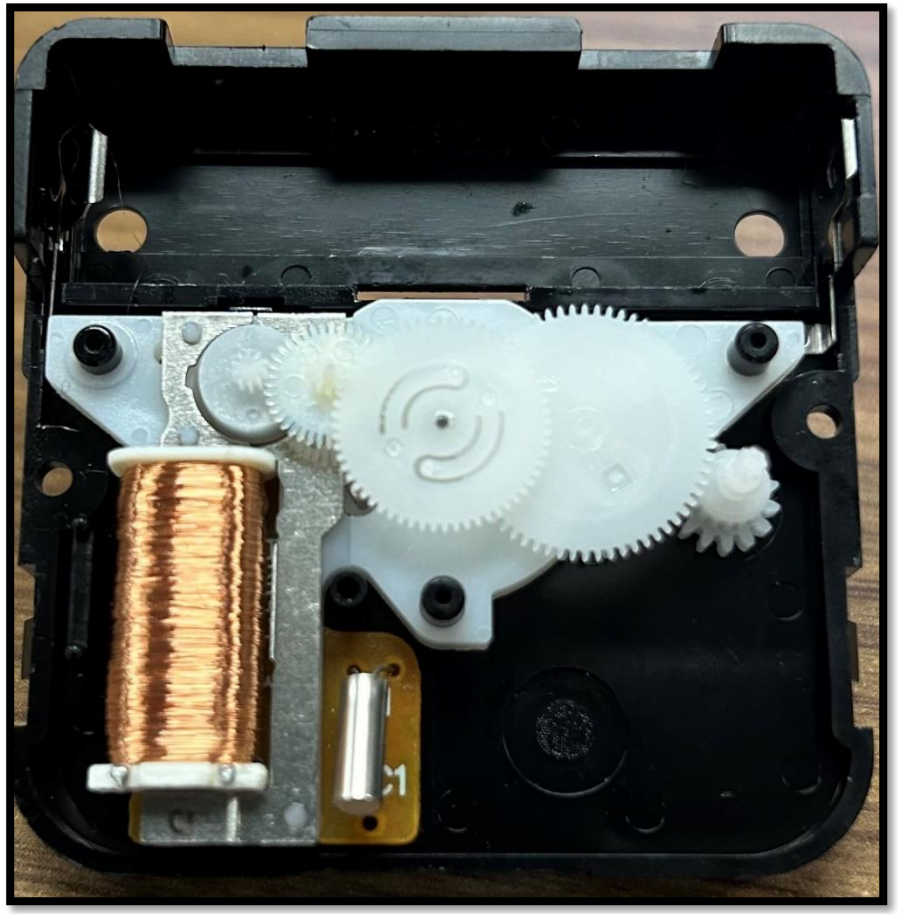
Project Objective: Design a fixture that maximizes the number of paint masks that can be held in a plastic bead media paint stripping cabinet.

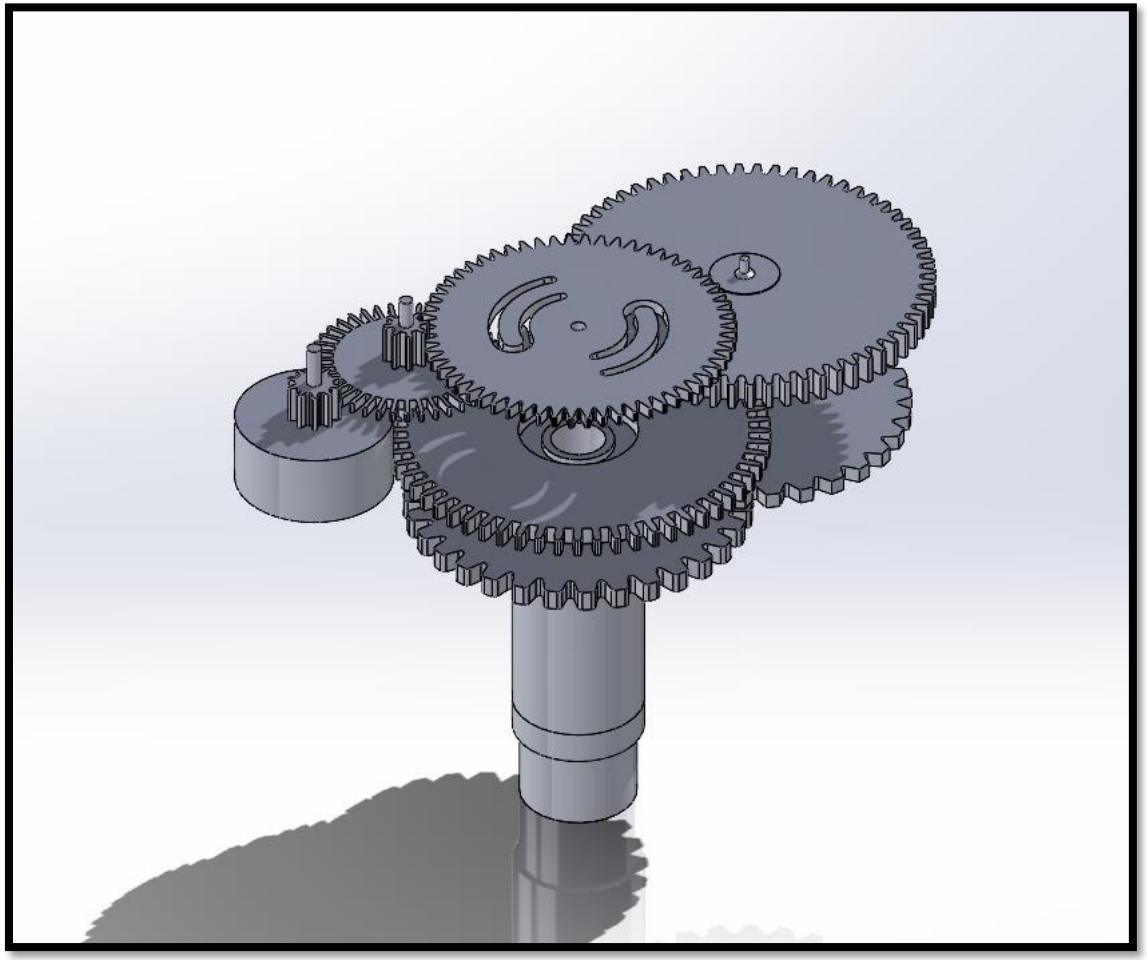




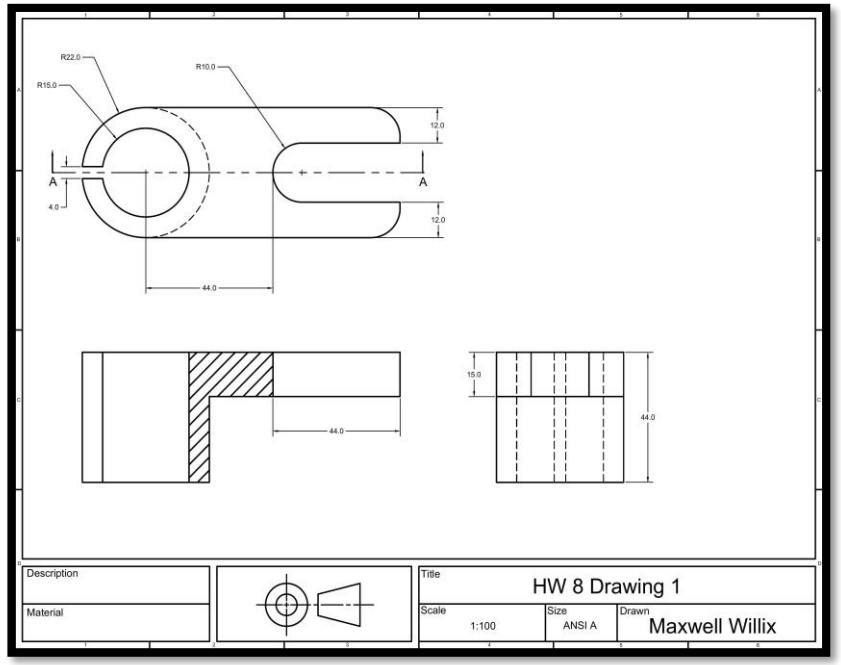
Maxwell Willix | Quartz Clock Reverse Engineering Project

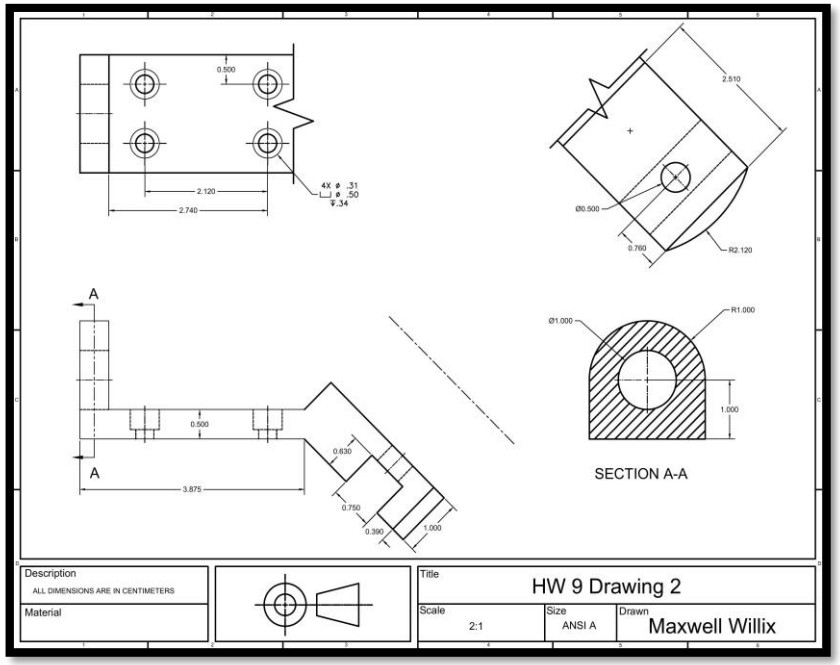
Project Objective: Reverse engineer a quartz clock by specifying product requirements, investigating materials and manufacturing processes of each part, creating a functional bill of materials, and creating CAD and mathematical models of the drive train.

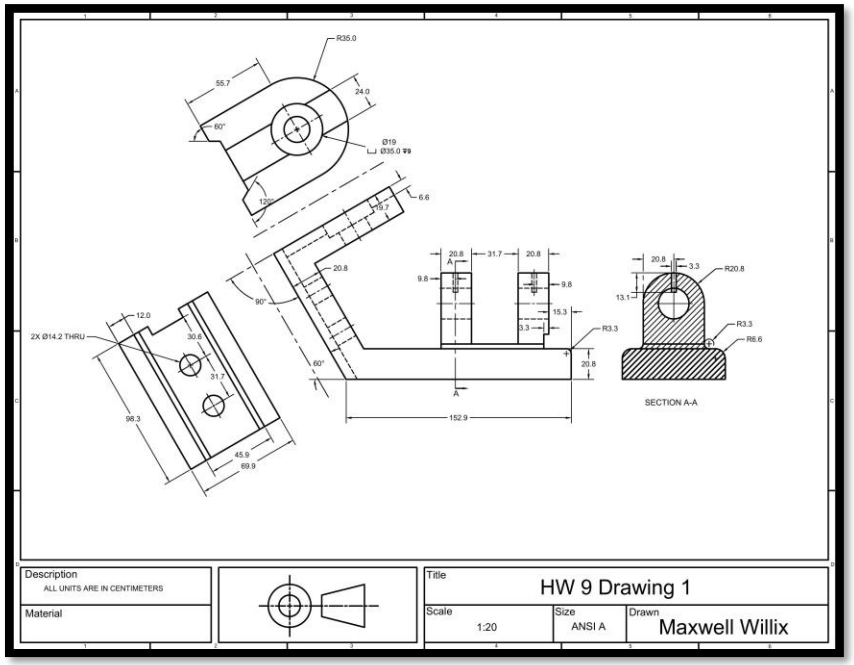




Maxwell Willix | ENGR 253L (CAD I) AutoCAD Drawings







Maxwell Willix | Headlight Reverse Engineering Project

Project Objective: Reverse engineer a battery powered head light to learn how it operates by decomposing it into its parts, creating CAD models, and a functional bill of materials.

Original Device

SolidWorks Model

Functional Bill of Materials

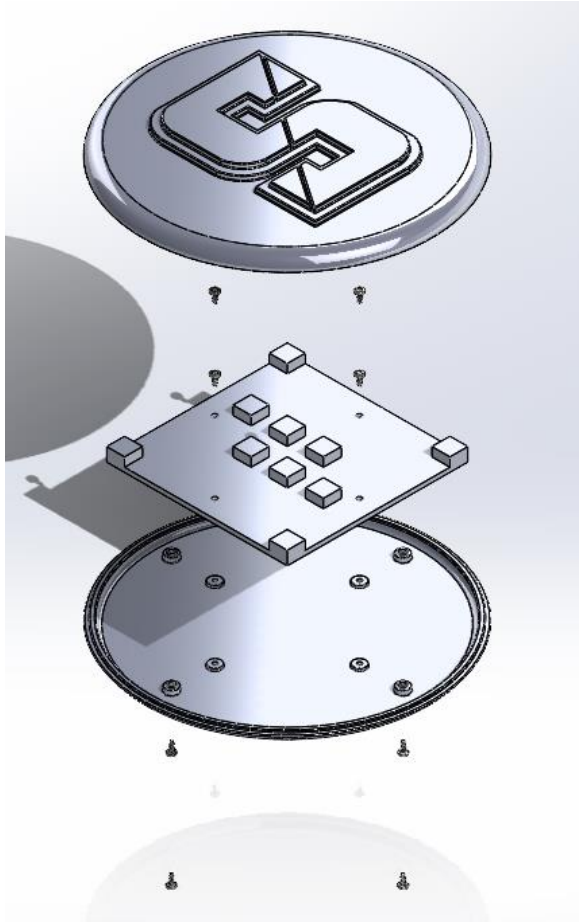
Part Number	Part Name	Quantity	Classification (Custom or Standard)	Material	Function of Part
1	Lens casing	1	Custom	Rubber	Protect and support the lens
2	Lens	1	Custom	ABS plastic	Protect the LEDs
3	LED casing	1	Custom	ABS plastic	Keep the LEDs in place
4	¼ inch phillips head screw	4	standard	metal	Secure other parts in place
5	Battery Pack cover	1	Custom	ABS	Keep the battery pack in place to pass a charge
6	Battery Pack Cover washer	2	Custom	Rubber	Keep battery pack cover from snapping
7	Battery pack	1	Custom		Store the batteries and conduct the power
8	LED mount	1	Custom	ABS	Keep lights in place
9	Power button casing	1	Custom	ABS	Protects the switch and holds the button in place.
10	Power button	1	Custom	Rubber	Over the on switch for the LEDs, press to turn on
11	12 LEDs	1	Custom	ABS	Create light
12	Wire	3	Custom	Metal with a rubber coating	Conduct power from the switch to the LEDs
13	Switch	1	Custom	PCB	Allow power to go from batteries to the light
14	Philips head bolt	1	Standard	Metal	Connects LED mount to the hinge
15	Hex nut	1	Standard	Metal	Secure the bolt in place
16	Headlight frame	1	Custom	Plastic	Protects and contains the components of the LEDs
17	Hinge and Strap clip	1	Custom	Plastic	Allows motion on the headlight frame and connects the straps

Functional Bill of Materials

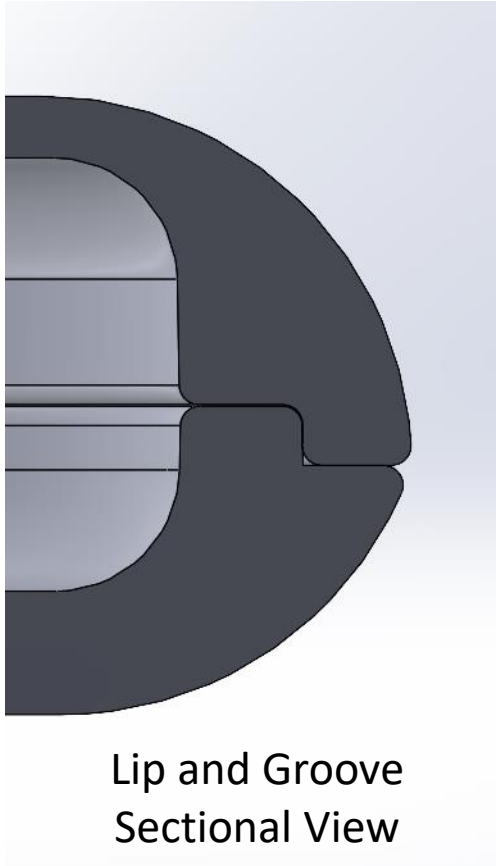
Maxwell Willix | Injection Molded Restaurant Pager Project

Project Objective: Design a restaurant pager that houses a given PCB board that makes use of screw bosses and adheres to injection molding design guidelines.

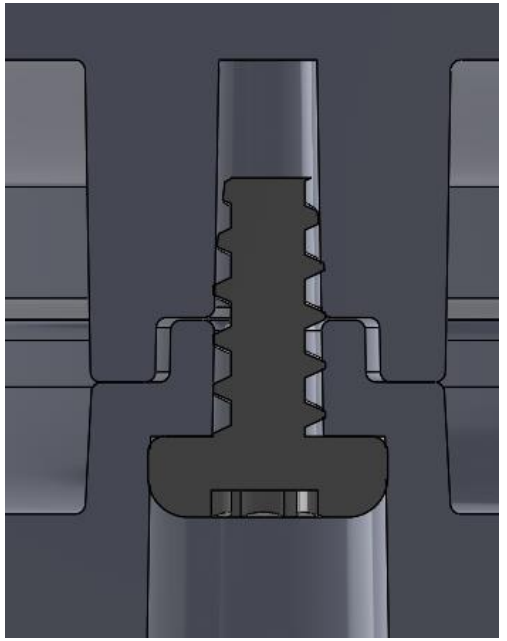
Isometric View



Exploded View



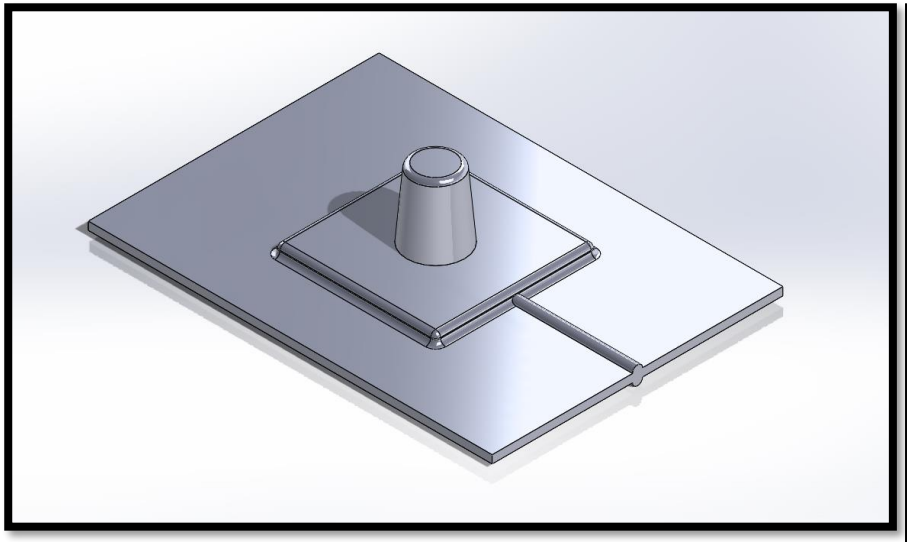
Lip and Groove Sectional View



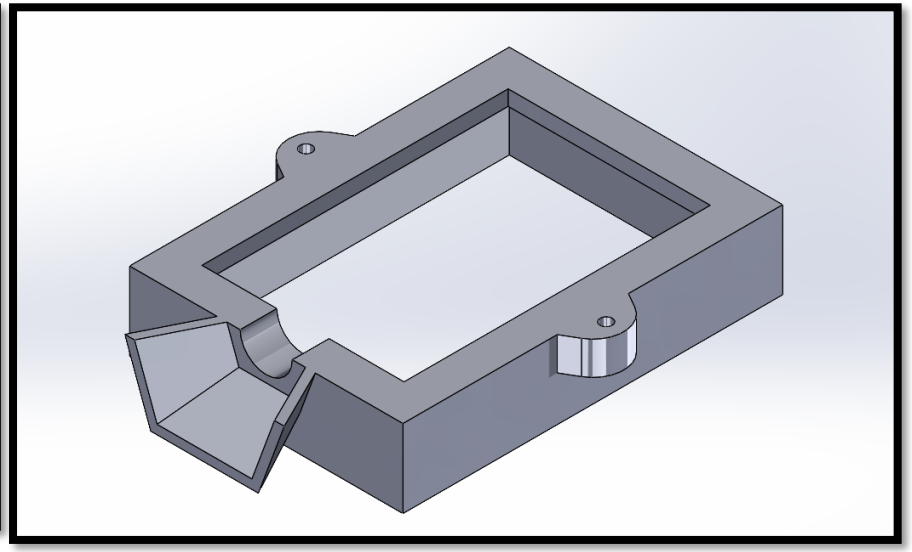
Screw Boss Sectional View

Maxwell Willix | Sand Casted Ring Stand Project

Project Objective: Design and Manufacture a display stand by 3D printing a pattern and using it to sandcast aluminum.



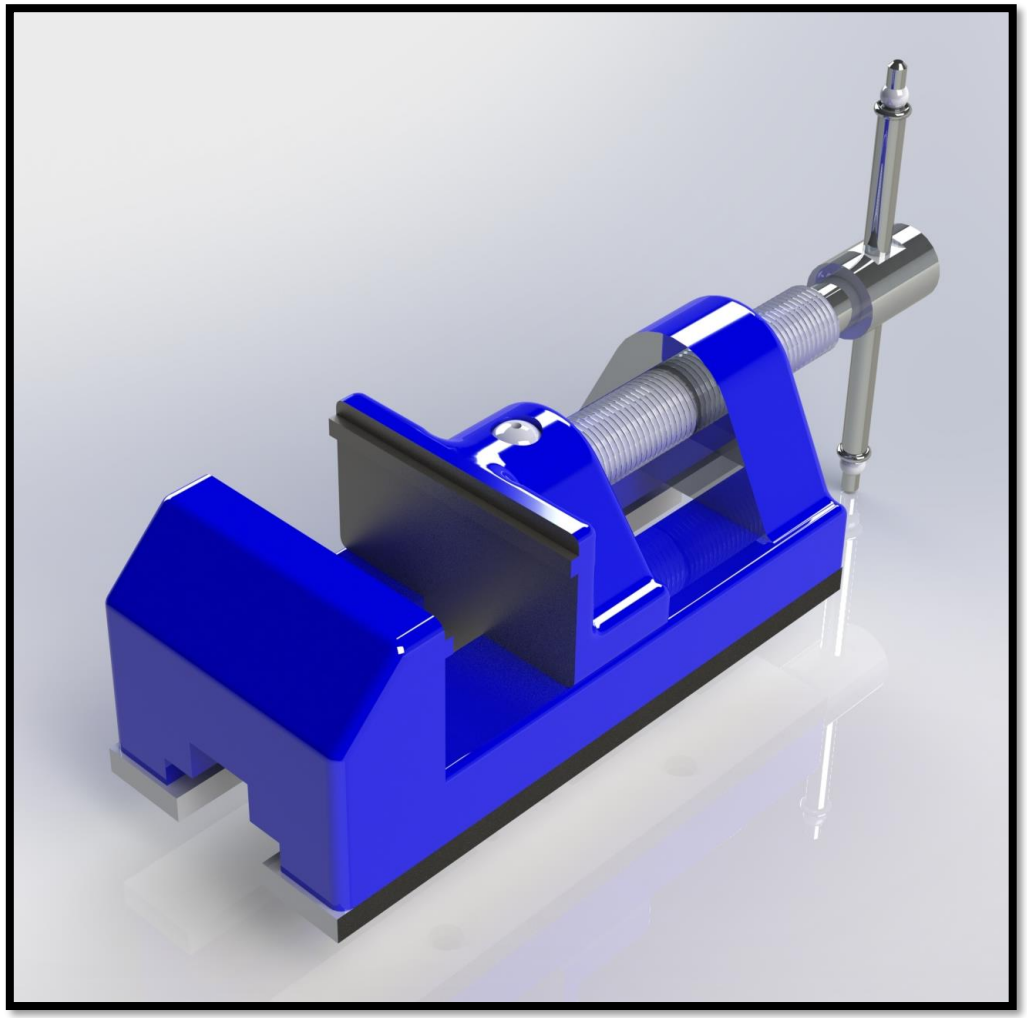
Pattern

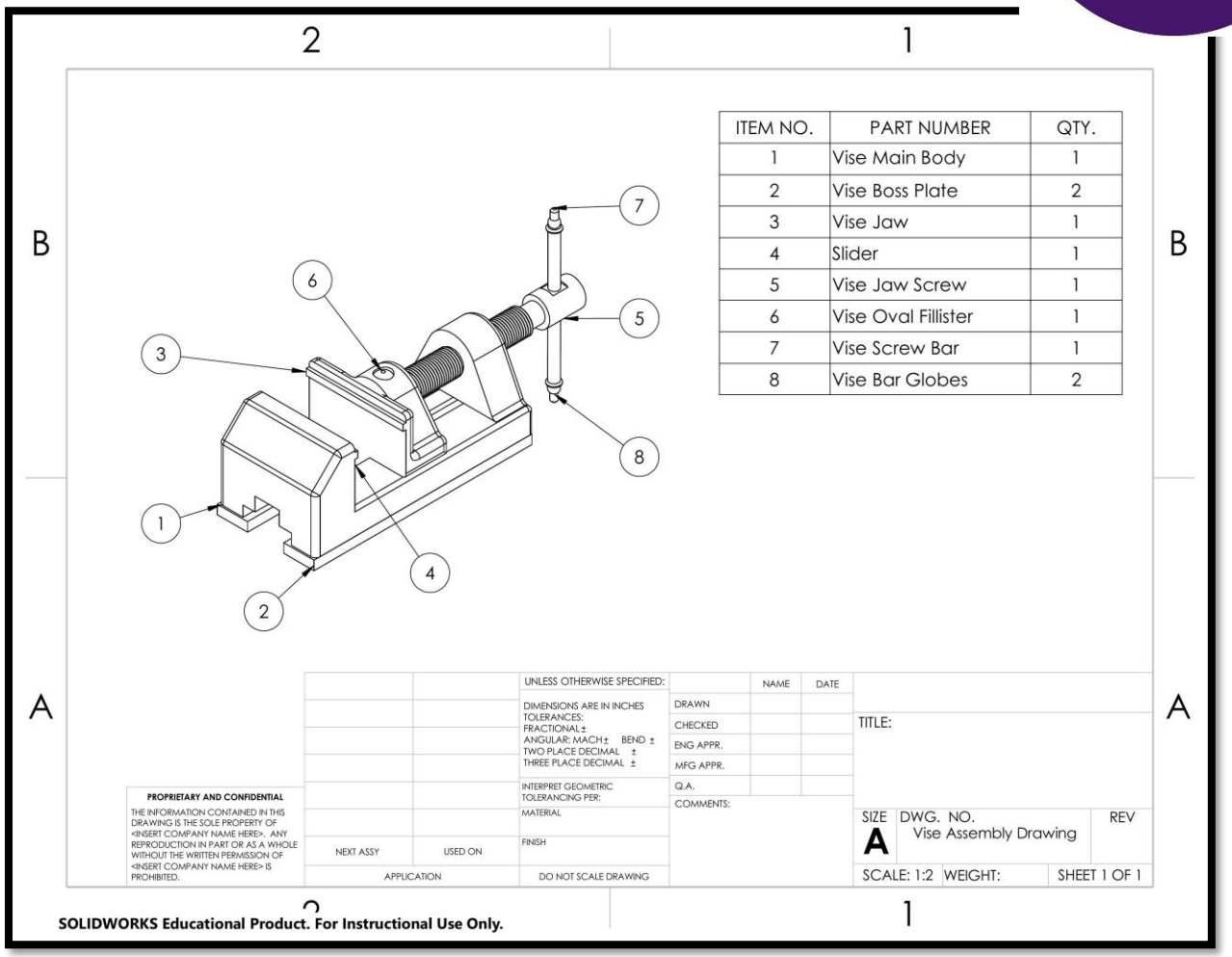


Cope/Drag

Finished Project

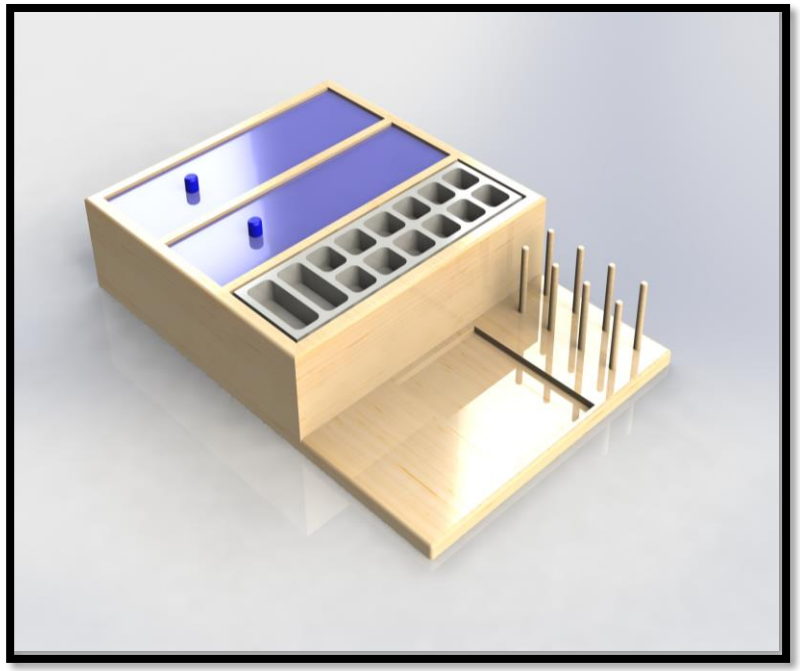
Maxwell Willix | ENGR 254L (CAD 2) Vise Project



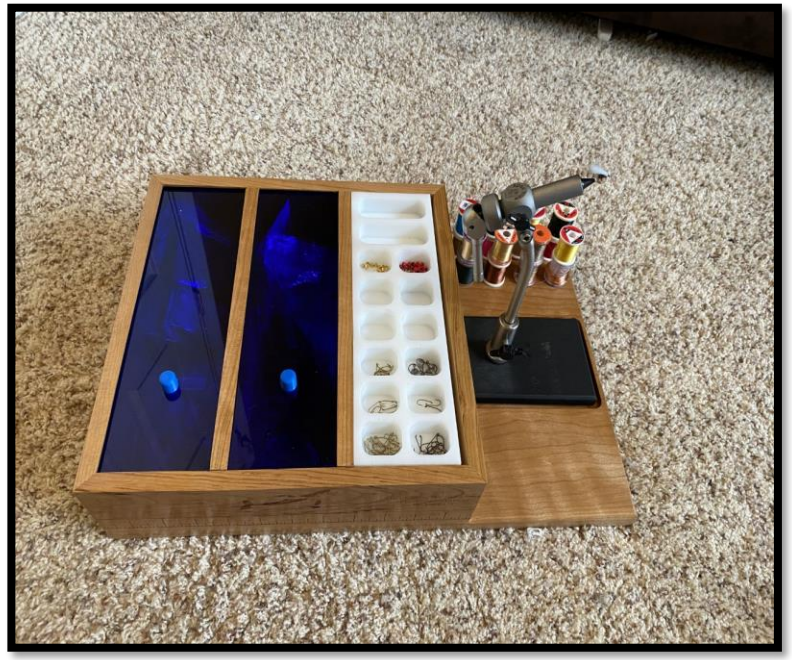


Maxwell Willix | Fly Fishing Fly-Tying Station (Independent Project)

Project Objective: Design and manufacture a desktop organizer for fly-tying supplies that also functions as a fly-tying workstation.



SolidWorks Model



Final Prototype

Maxwell Willix | Multi-Level Charcuterie Board (Independent Project)

- Project Objective: Design and build a charcuterie board that has multiple levels to display meats and cheeses in a more exciting manner than a flat board.

SolidWorks Model

Final Prototype