‘Dronaway.’ Delivery Drone

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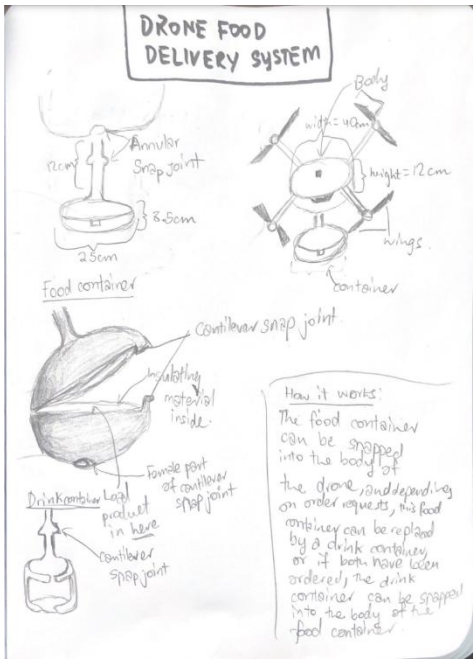
Project Description:

To fulfill the assignment criteria, challenge my creative abilities, and demonstrate my understanding of the class material, I attempted to model a delivery drone. My attempt was seeking to capture the conventional design of a drone, with a chassis, attached on the bottom to a container system, which would potentially be able to hold a package/food item. I've always had an interest in aviation and more specifically, drones, so this interest inspired me to 3-D model an actual drone – something I've never done nor attempted to do before.

The design of the drone chassis was based on simple extrusions of a square body, chamfered on all four corners to give room for the bases for each of the four wings of the drone. The wing-stands were extruded such that they had a sufficient height above the rest of the chassis. The bottom of the chassis had a cut extrusion as an attempt to create a point for me to attach the container to. The top of the chassis had the text 'Dronaway.' as the title of my project.



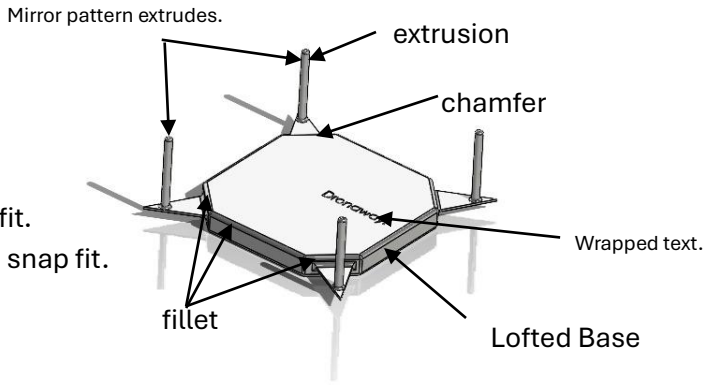
For the design of the container attached from the bottom of the chassis, I used simple extrusions and a shell to create the cuboidal container, with an extra extrusion at the top of the cylindrical container support as an attempt to create an annular snap joint to complement the extruded cut at the bottom of the chassis.

My idea was for the wings to be held on the wing-stands, and for the container to snap onto the bottom of the chassis, and I hoped to design the drone such that it could easily be snapped onto the chassis, for easy attachment and detachment.

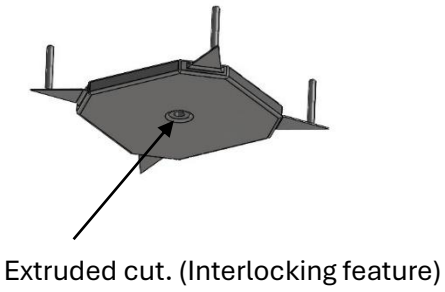
CAD Features:

Chassis

- Lofted base: Drone Body.
- Extrusion: Wing stands.
- Mirror Pattern extrudes: Wing stands.
- Test extrusion: 'Dronaway.'.
- Extruded cut: receiving part 1 for attempted snap fit.
- Extruded cut: Deeper receiving part for attempted snap fit.
- Fillet: drone edges .

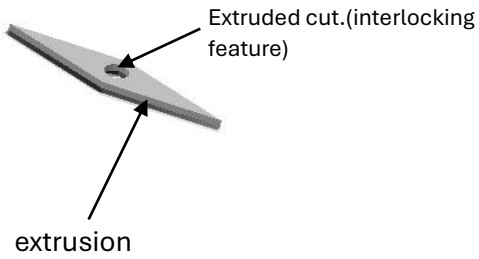


- Extrusion: Wing bases.



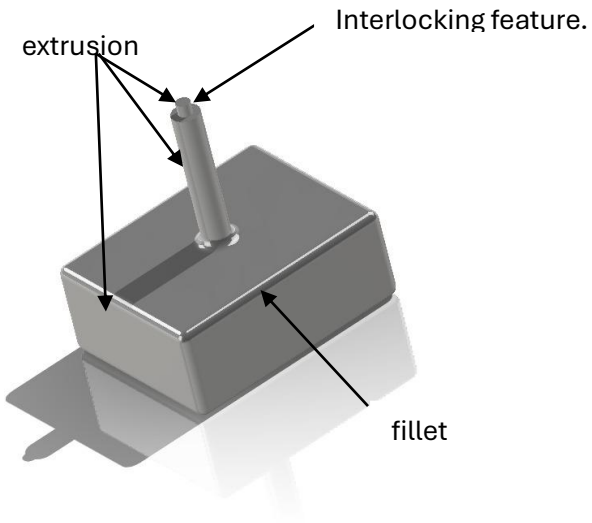
Propeller

- Extrusion: wing shape.
- Extruded cut: wing attachment hole.



Container

- Extrusion: container body.
- Extrusion: container attachment support.
- Extrusion: Attachment point.
- Fillet: container edges.



Interlocking Parts.

This design has two main interlocking features: a snap fit consisting of the top of the container attachment support and the extruded cut at the bottom of the chassis, and an attachment of the propeller to the wing stand. The snap fit was created to hold the container to the bottom of the drone when in use, and to allow the container to be easily detached from the drone chassis when required. The attachment of the propeller to the wing stand was intended to hold the propellers to the drone stand, although I understand the design was somewhat flawed such that the propellers were only held by frictional forces and there's nothing to actually hold the propellers to the wing-stand. The intention was to somehow attach these features together.

Design for manufacturing considerations

The first step taken to begin the design process was to attempt developing parts with dimensions that are confined to the 3 x 3 x 3 size parameters provided in the design limitations. The chassis body was dimensioned to be

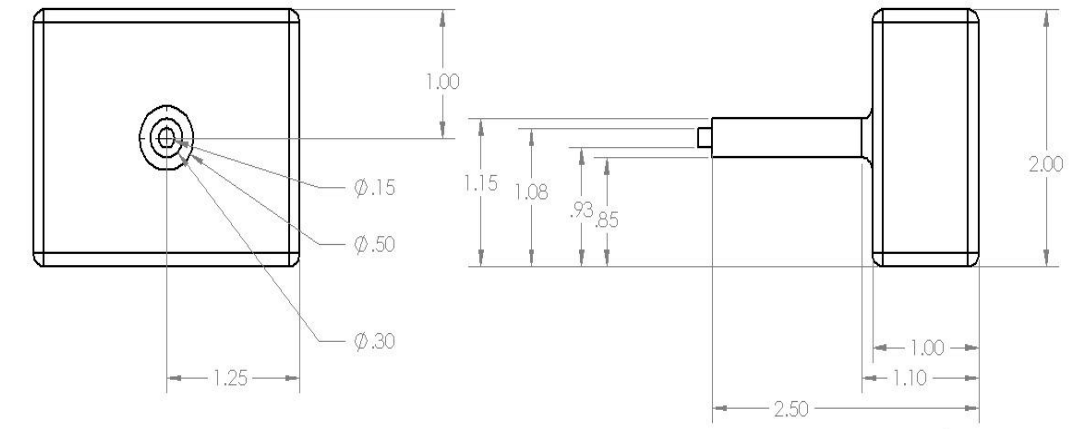
Challenges Faced in Manufacturing

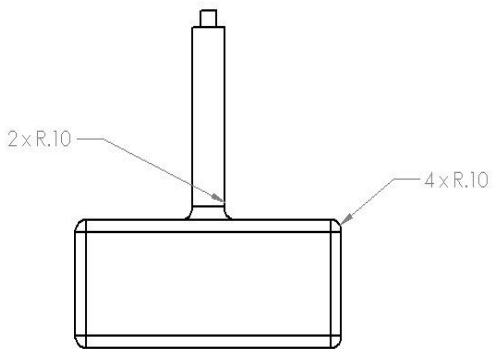
My design - although it had the right motives - had some very crucial flaws. The first major mistake I made which led to a sever manufacturing challenge was my failure to include STL files of my designed parts – therefore causing a major inconvenience in the 3D printing process as my part and assembly files had to be modified to 3D print.

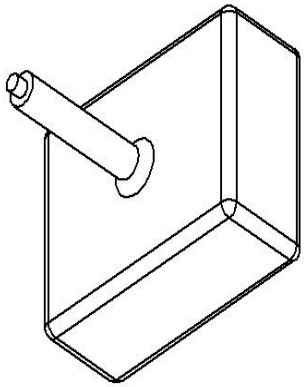
The second major flaw in my design was the failure to consider engineering tolerance – all my parts were dimensioned to be printed EXACTLY as they were created, such that slight, acceptable differences in the 3D printed model gave me challenges in assembling the model. Most notably, the 'snap joint' that I tried creating wouldn't assemble as firmly as intended because I didn't leave any room for engineering tolerances. In addition, the snap fit would hold partially only due to the forces of friction and gravity, and wasn't designed in a way that could practically allow the two parts to snap together - the same goes for my propeller; it didn't actually have anything to be attached to on the wing stands, and was only being held in place due to the forces of gravity and friction.

Another problem faced in the manufacturing process was that my design didn't meet the volume requirements, which were 3 cubic inches. All in all, my assembly had a total volume of 6.84in^3, which was way above the required dimensions. There was also a problem in my design regarding the number of parts; the required number of parts was no more than 4, whilst my design needed 4 wings to be printed for each of the wing stands, which brought the overall number of printed parts to 6 – exceeding the limit.

In retrospect, fundamental defects in my design, due to failure to follow all the instructions given to me in addition to ignorance of factors like engineering tolerances rendered my final 3D model to be un-assemble-able. However, I have since tweaked my model and have been able to create a much more satisfactory product and have taken away a lot from the errors I've made in the design process, and in the process picked up on more crucial skills that I can apply in more the future.







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	COURSE: ME 1670	SEMESTER: FALL 2015	SECTION: D	LAB	ACTIVITY	DIMENSIONS ARE IN INCHES ANGLES ARE IN DEGREES	SIZE: A
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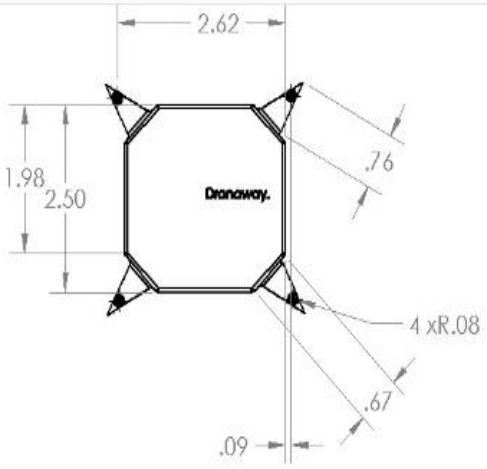

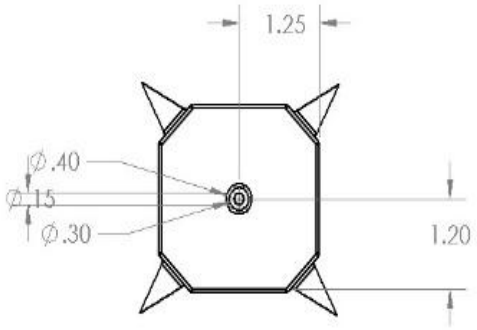

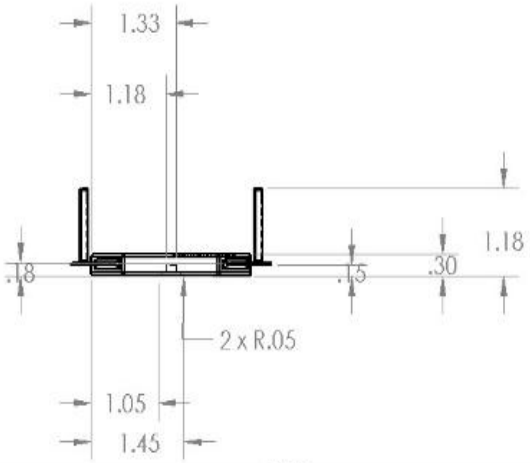

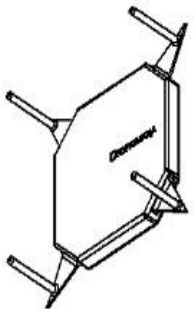

Georgia Institute of Technology	TITLE: Chassis Drawing		DATE: 4/19/2024	NAME: Dev Shah			
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