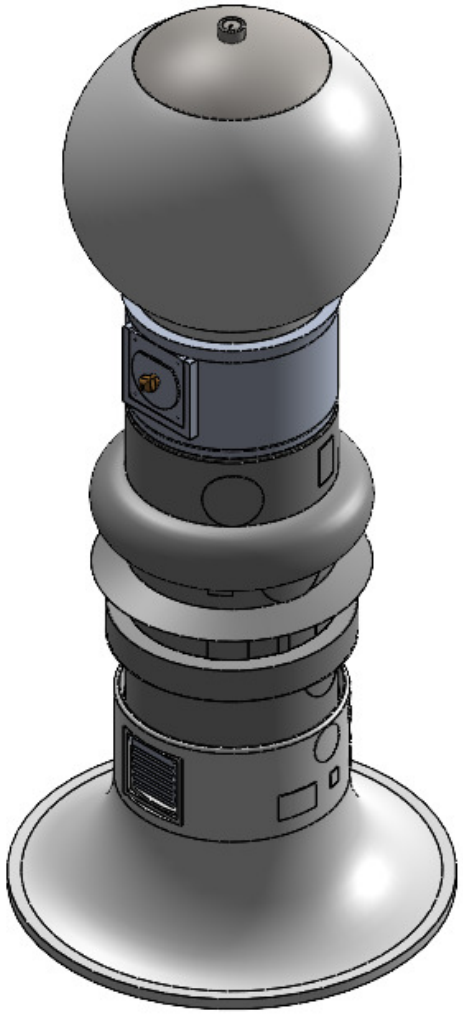


ME 212 ENGINEERING
GRAPHICS PROJECT
AUSTIN TONOVITZ
TU 2:30
SPRING 2024

TABLE OF CONTENTS

ME 212 ENGINEERING GRAPHICS

SPRING 24 PROJECT – GUMBALL MACHINE

Introduction:

Kansas State Engineering is asking you to design a gumball machine to put in the Fiedler Learning Center. You are asked to use SolidWorks to create this design. You will be provided with detailed drawings and guidelines to model this gumball machine. Kansas State Engineering submitted this request with a general outline for the parts they want modeled. However, there are some parts that Kansas State Engineering is trusting you with design freedom. For parts that you have design freedom in, you must follow given specifications. K-State anticipates that students studying in Fiedler Learning Center will appreciate a sweet gumball treat, and trusts that you will produce the results to create a functional and aesthetic gumball machine.

Important Information:

- This project is worth 20% of your final grade
- Project parts will be provided in two sub-assemblies
  - Structure Sub Assembly – **Day 9**
  - Coin Mechanism Sub Assembly – **Day 9**
- Your project will be reviewed at two milestones. Milestone reviews do not count towards your final project grade.
  - Milestone 1 – All parts due – **Day 17** (March 20/21, 2024)
  - Milestone 2 – All detailed drawings due – **Day 21** (April 3/4, 2024)
- **These reviews are to keep you on schedule for finishing the project on time, but you should aim to have your parts complete by Day 17.**
- Your final report must be printed in color and have a clear cover and spiral binding along the top edge. This can be done at the Union Copy Center or similar businesses. Everything in your final report must be in landscape orientation and ANSI standard.
- Your USB drive is to be placed in a commercial sleeve or pocket at the back of your report. Your USB drive must have your name, section, and ME212 written on a piece of masking tape, stuck to the USB drive.
- **YOUR COMPLETE REPORT IS DUE AT THE END OF YOUR CLASS ON DAY 26 (April 22/23, 2024)**
  - Projects will not be accepted prior to the due date.
  - Your report shall be considered late if not turned in by the end of the class period

- Late reports will only be accepted between 11:20 AM and 11:30 AM on the Thursday immediately following the due date (April 25, 2024), in our regular classroom. All late reports will incur a 10% penalty.
- No project will be accepted after the late acceptance date.

Project Report:

Utilizing information available on Canvas, create parts, assemblies, drawings, and design descriptions. Assemble a report **in the following order:**

0. **Grade Sheet** – This will be provided by the instructors when the project grade is returned
1. **Cover Page** – Your Cover Page must include the following information:
   ME 212 ENGINEERING GRAPHICS PROJECT
   Your Name
   Your Section (i.e. MW 8:30)
   The current semester and year (SPRING 2024)
   An isometric image of your gumball machine (in color), with shadows and any background off
2. **Table of Contents** – (NOTE: Your table of contents must be *in this exact order with page numbers*. The page numbers in the table of contents should match the actual page numbers of your material. Page numbers should be printed and not penciled in. **Up to a 10% deduction for poorly formatted or missing table of contents**.

Provided Project Description
Project Report
Project Feedback and Constructive Criticism
Final Assembly
Coin Mechanism Sub Assembly
Backplate
Coin Receiving Disk
Faceplate
Pawl
Ratchet Gear
Screw (4X)
Spur Gear
Turn Handle
Structure Sub Assembly
Base
Center Rod
Chute
Coin Collection Disk
Dispensing Disk
Door Attachment
Door

Globe
Gumball Path
Head
Lid
Separator (top)
Separator (bottom)
Shaft

3. **Provided Project Description** – You must include a printout of this document.

4. **Project Report** - In addition, you are to include a 500-700 word report. This report must discuss what the project is and why you are designing it, as well as a brief summary of your design freedom and modifications made to parts. This report can also discuss but is not limited to: a system design description in your own words, challenges overcome in the project and/or class, information and skills learned in the project and/or class, professional and personal development from the project and/or class, any setbacks you may have encountered in the project and/or class, and lessons learned in the project and/or class.

5. **Project Feedback and Constructive Criticism** – Dr. Baboly and the instructors are continually trying to improve the project. Please provide feedback and/or constructive criticism for anything about the project you think could be improved. Nothing said in this section will affect your grade. The more feedback and the more specific, the better, but please be constructive and not mean.

6. **Assemblies** – Assemblies must be printed in color. For each assembly and sub assembly, you must provide two pages in the following order: 1. an isometric view and 2. an exploded view with BOM. The BOM must include item number, part, and quantity. All parts in the sub-assemblies are to immediately in the given order.

   *Note that the structure sub-assembly is very tall, so it is fine to have some parts to the side and break the exploded view rules. The exploded view just must be organized in a logical manner and visually appealing, even if it does not exactly follow the rules.

7. **Parts** – Each part must be in the following order: First page is to have the isometric view of the part, printed in color. Next page(es) shall have the associated detailed drawing of the part, it will immediately follow the detailed drawing.

8. **USB Drive** – You will be provided with a USB drive by day 9 for project rollout. Once your USB drive is turned in with your project, you will not get it back – do not store any personal files on this flashdrive. Your USB drive must include all your SolidWorks files (parts, assemblies, and drawings) for the project. Everything should be saved to one .zip file for correct

linking. Your USB drive must have your name, section, and ME212 written on a piece of masking tape and taped to it. All files must open correctly and be properly linked. Files that are not properly linked will not receive any credit.

Grade Breakdown in Points:

Basic Requirements:	100
Parts:	305
Drawings:	295
Assemblies:	300
Total:	**1000**

Rules, Guidelines, and Notes:

- ALL WORK (templates, keystrokes, mouse clicks, etc.) MUST BE YOUR OWN.
- The turn handle should spin the other parts of the coin mechanism, which will rotate the dispensing disk and release a gumball from the globe.
- Scale your printouts to fit on single-sided 8 ½ x 11 sheets (landscape).
- Your drawings should be neat and organized with all text capitalized.
- No sketches, planes, or axes should be shown.
- All units are in IPS.
- Everything is in ANSI standard.
- Do not copy provided drawings – they are purposely made 'badly' and do not follow the rules. Any drawing directly copied from that provided will be given a 0.
- Use the provided checklist to ensure there are minimal point reductions.
- Note that the cost to print the project with the spiral binding and clear cover page, etc. is about $15-20.

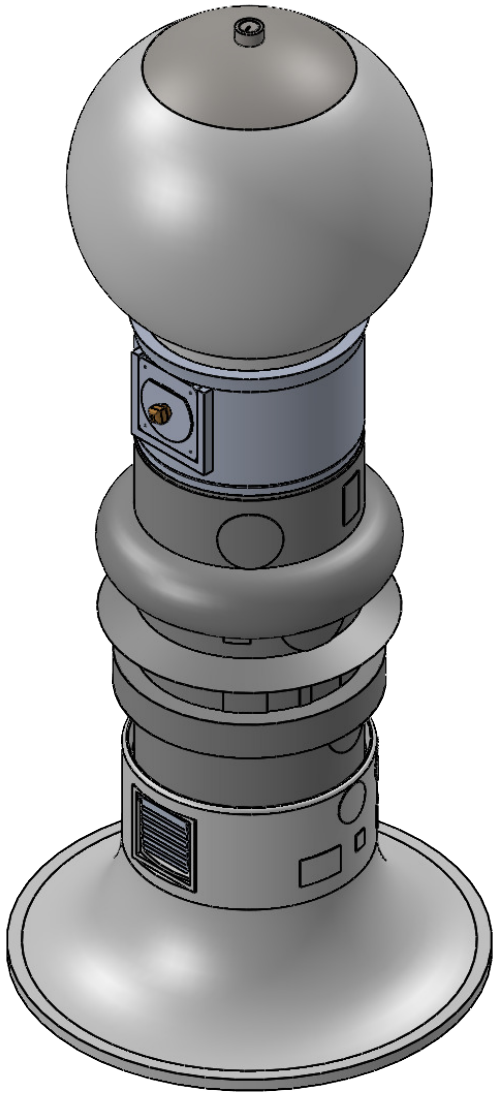
SAVE EARLY
SAVE OFTEN
SAVE IN MULTIPLE LOCATION
LOST WORK IS NOT A VALID EXCUSE

PROJECT REPORT

In this project, we were requested to design a gumball machine to be put into the Fiedler Learning Center using Solidworks. We were provided with detailed drawings for each part of the gumball machine and needed to design each part relatively perfectly. The detailed drawings that we were provided were purposefully incorrectly formatted and had incorrect dimensions so we could later make our own detailed drawings for each part. We were given design freedom on certain parts of this project to try to maximize the number of students who will use the gumball machine. The gumball machine works by holding gumballs in the globe at the top, someone will put a coin into the coin mechanism, and that allows the handle to turn. The turning of the handle aligns the Separator top, separator bottom, and the dispensing disk allowing 1 gumball to fall down through the Chute. The gumball then drops from the chute onto the gumball path where it rolls down to the base where someone can open up the door and take their gumball. We designed each individual part for the coin mechanism and the structure. We assembled them both separately and then assembled the 2 sub-assemblies together. The gumball machine is fully functional in solid works, this is due to using the proper mates and advanced mates in the assembly process. The biggest challenge for me was designing the Head and the Base exactly accurate to the detailed drawings. Specifically for those 2 parts, it was difficult to interpret what exactly it took to design the part from the drawing at certain points. I am very glad that this project taught me a lot of the skills to properly design advanced 3D parts within solid works. I think throughout the class my ability to make solid parts improved the most and was crucial in this project. I was able to design every part of the coin assembly perfectly and I am very happy about that. The biggest setback of this project for me was due to my vacation out of the country for all of spring break. This made being able to properly manage the time to create all of the solid parts on top of my other class work I needed to get done ahead of time difficult. Another difficult part for me was knowing if I covered everything I needed to on the detailed drawings and knowing if I used the correct dimension or callout for a certain scenario. There were a couple of times I was unsure if I needed to dimension a circle in the overhead view or front view or if either was ok. But overall I think the project was a great tool to understand what it takes to properly design a project to get manufactured. Although sometimes some of the rules can be somewhat tedious, I think this class did an overall good job showing why they are important in the design process and why we as engineers need to understand them and know how to implement them properly.

PROJECT FEEDBACK AND CONSTRUCTIVE CRITICISM

Most of the project was great and I understood why we were doing every part of it, the one thing I didn't understand as much was the need for a formatted handbook. I can also see that this is an important skill, but it just seems more tedious than skillful. The instructions on the project discription dont feel like then have enough details about what all needs to be in the handbook. Other than that, I think it was an effective project to test our solid work skills.

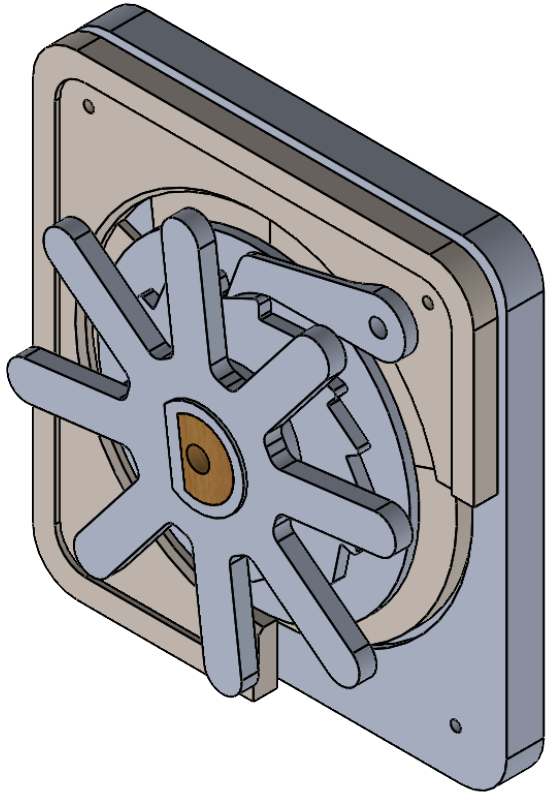


KANSAS STATE UNIVERSITY
College of Engineering

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
ASSEMBLY NAME:
Full Assembly

DESIGNER: AUSTIN TONOVITZ

SHEET 1 OF 1 PAGE 9 OF 57



KANSAS STATE UNIVERSITY
College of Engineering

EiD: atonovitz

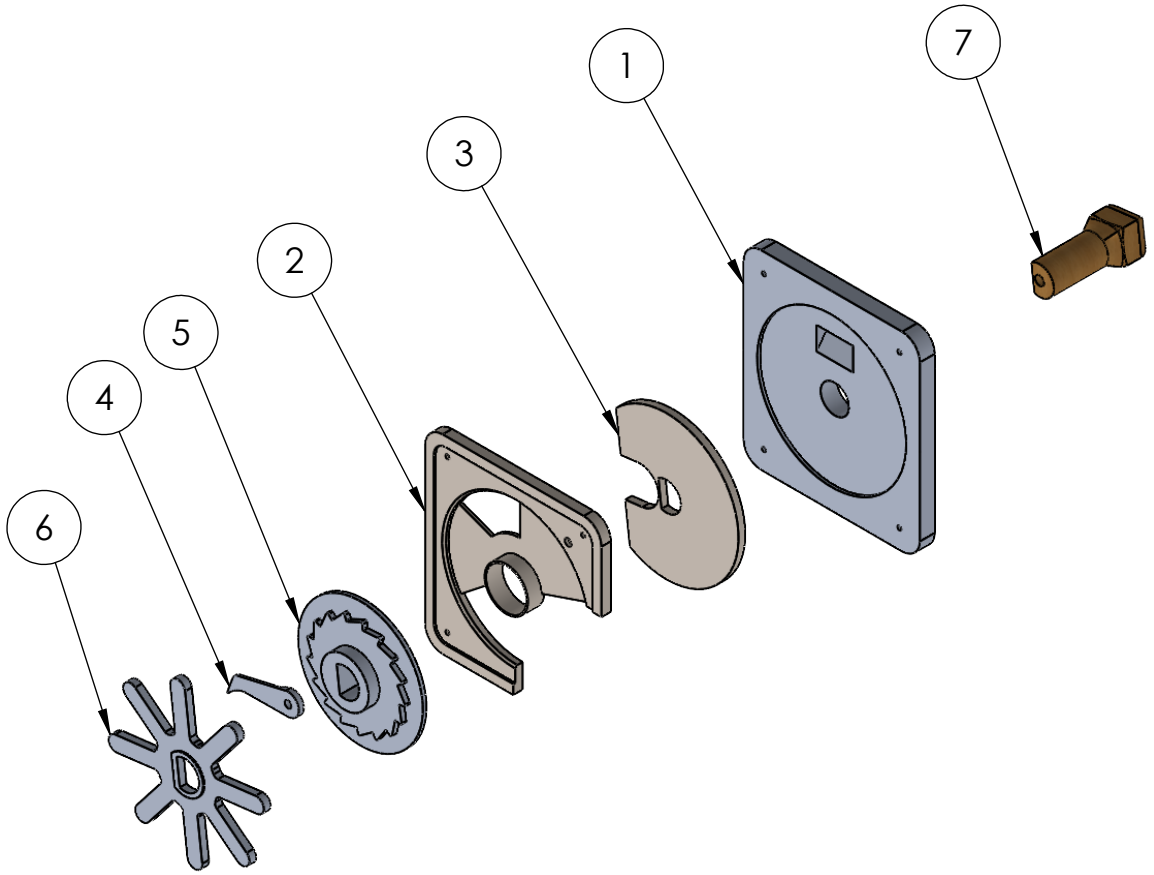
SECTION: TU 2:30 | DATE: 4/21/2024

ASSEMBLY NAME:
Coin mech assembely drawing

DESIGNER: AUSTIN TONOVITZ

SHEET 1 OF 2 | PAGE 10 OF 57

ITEM NO.	PART NAME	QTY.
1	Faceplate	1
2	Backplate	1
3	Coin receiving disk	1
4	Pawl	1
5	Ratchet Gear	1
6	Spur gear	1
7	Turn Handle	1

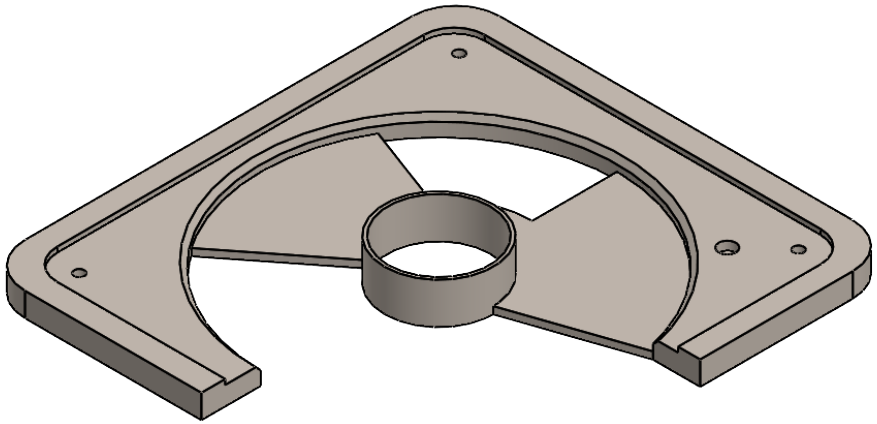


KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
ASSEMBLY NAME:
Coin mech assembely drawing

SHEET 2 OF 2 PAGE 11 OF 57



KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
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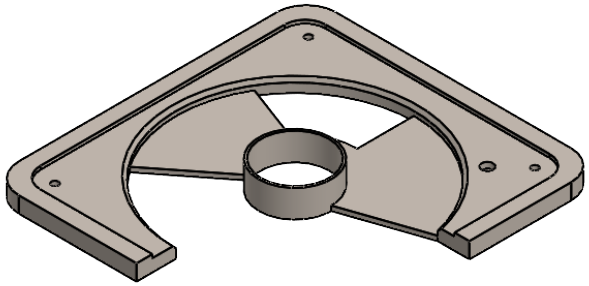
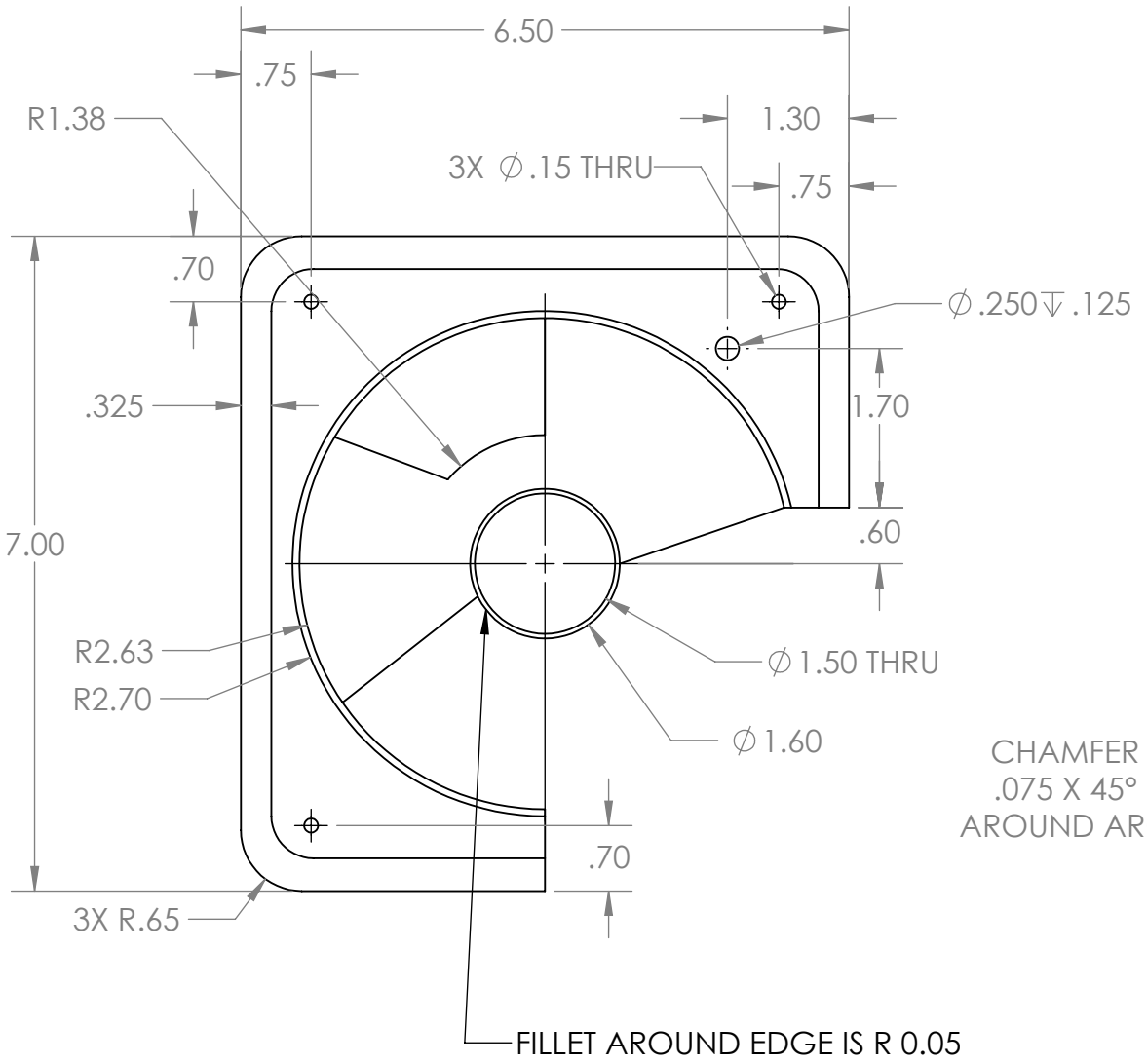
VOLUME: 6.20 in^3	.XX: ±0.05
MATERIAL: Alumina	.XXX: ±0.001

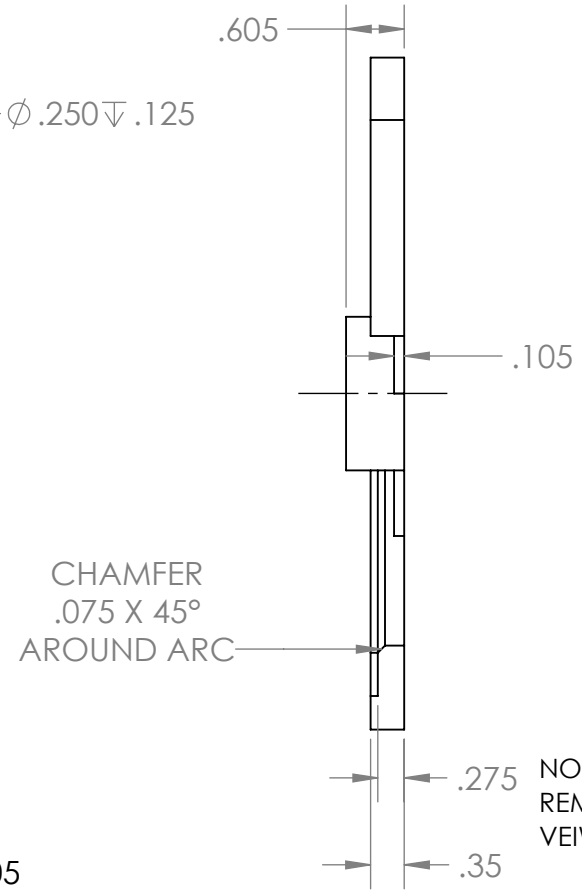
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Backplate







NOTE: HIDDEN LINES REMOVED IN RIGHT VEIW FOR CLARITY

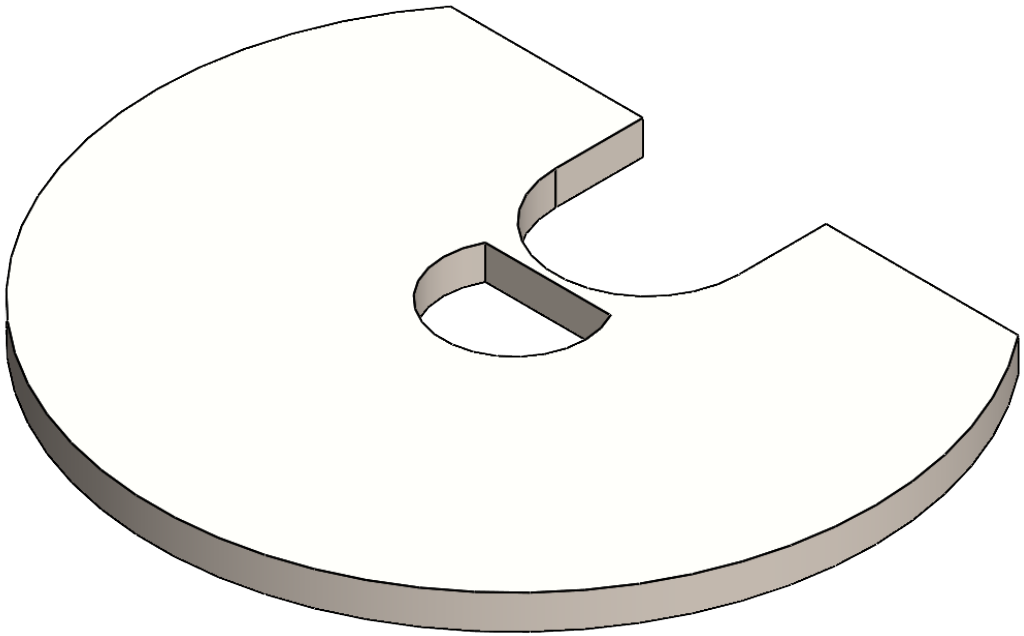
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 0.89 lbs	.X: ±0.1
VOLUME: 6.20 in^3	.XX: ±0.05
MATERIAL: Alumina	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 DATE: 4/21/2024

PART NAME:
Backplate



KANSAS STATE UNIVERSITY
College of Engineering

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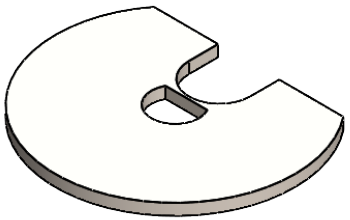
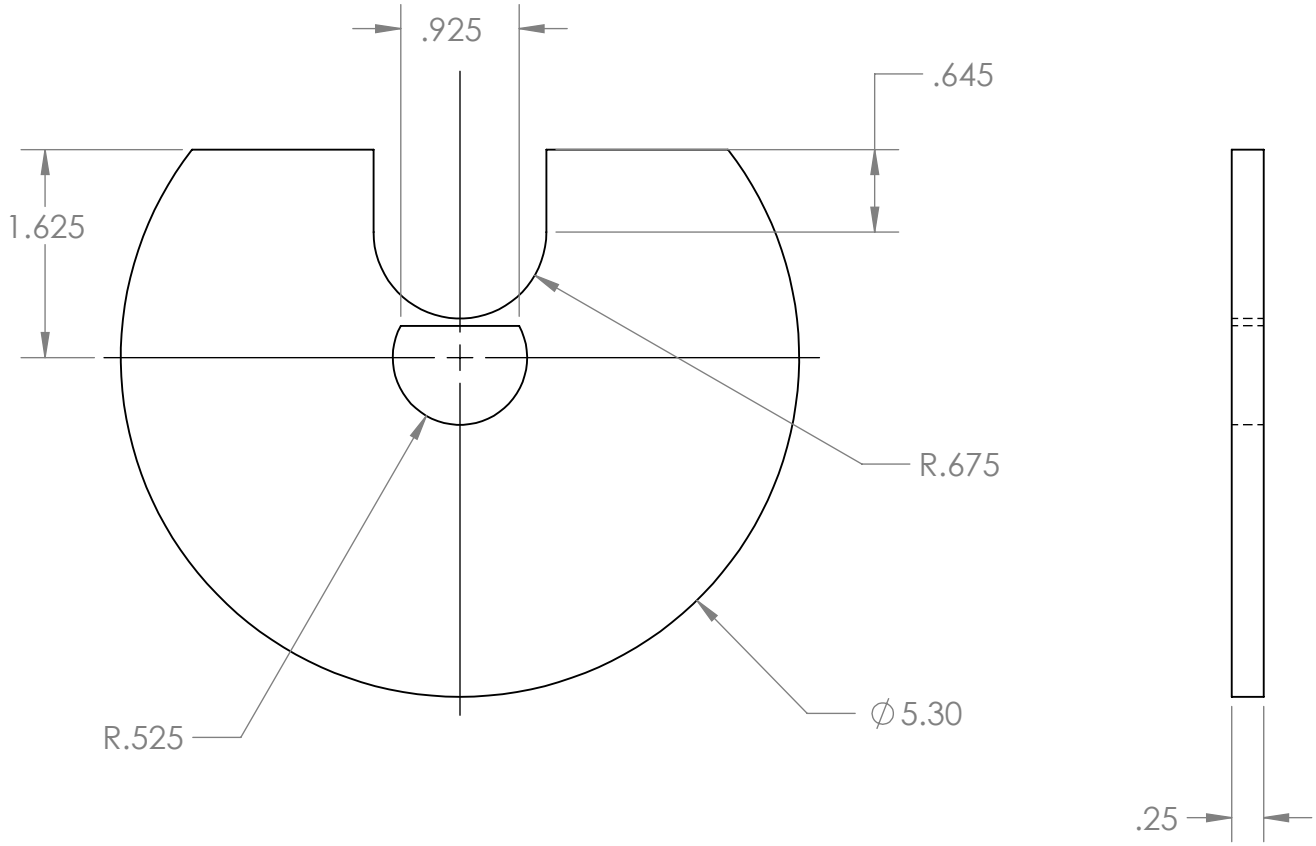
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Coin receiving disk





KANSAS STATE UNIVERSITY
College of Engineering

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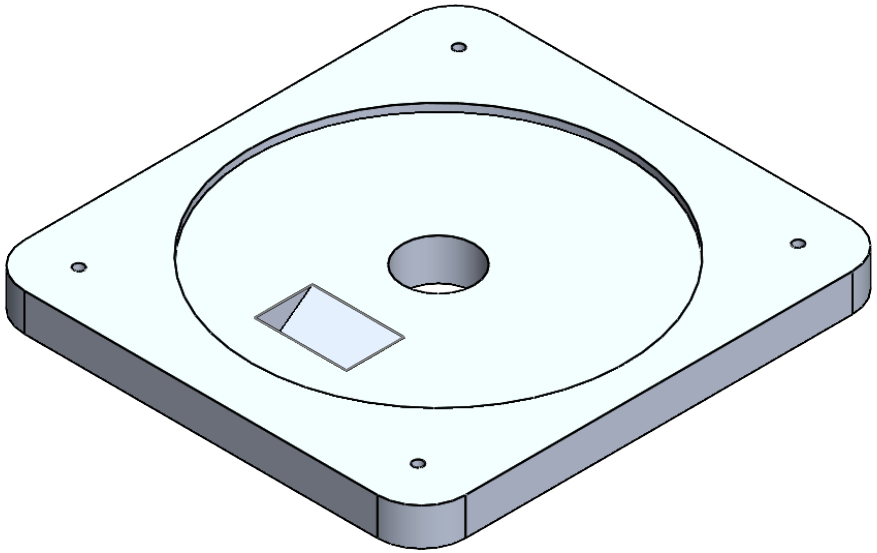
VOLUME: 4.20 in^3	.XX: ±0.05
MATERIAL: Alumina	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
Coin receiving disk



KANSAS STATE UNIVERSITY
College of Engineering

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EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
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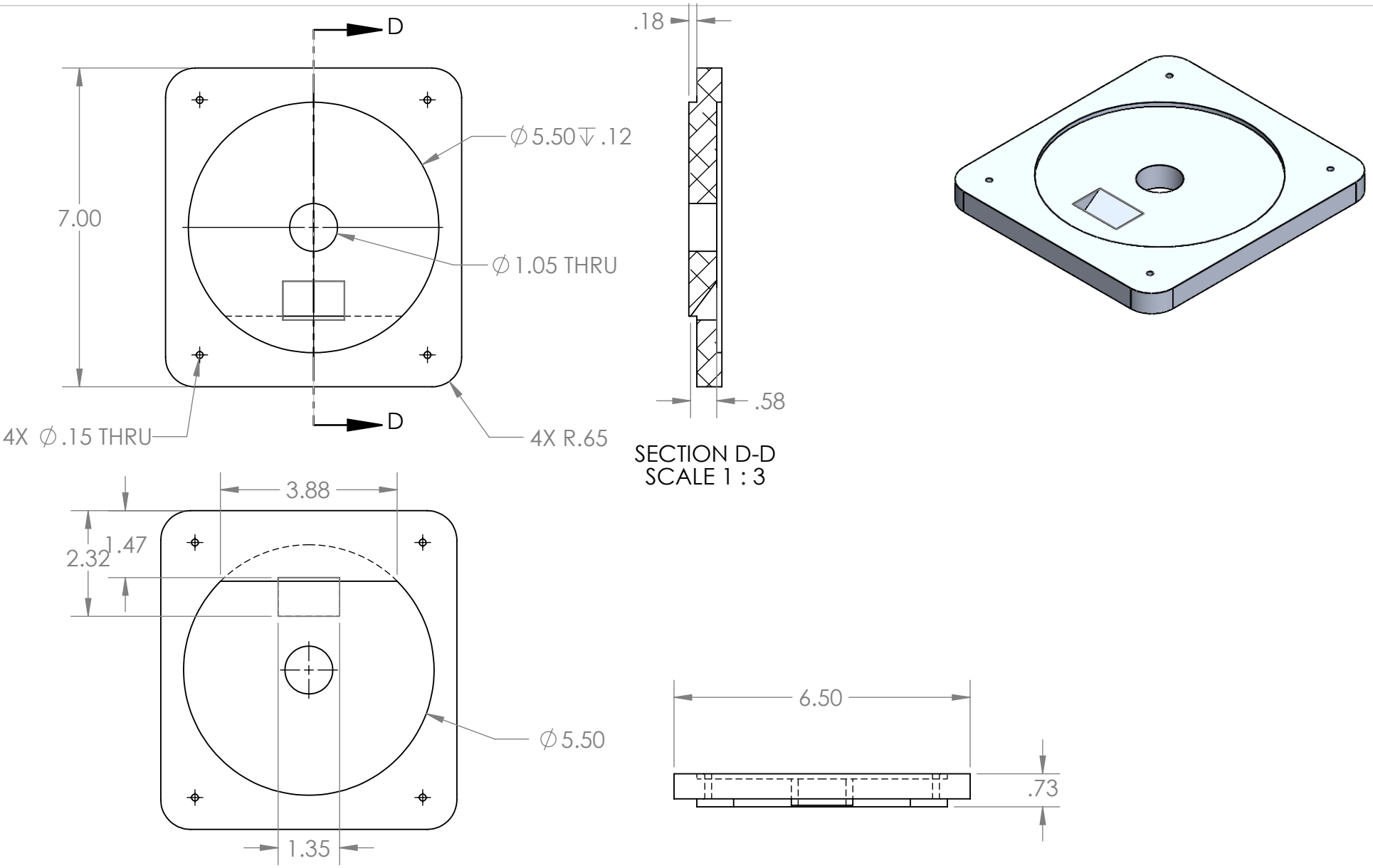

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 2.44 lbs	.X: ±0.1
VOLUME: 24.96 in^3	.XX: ±0.05
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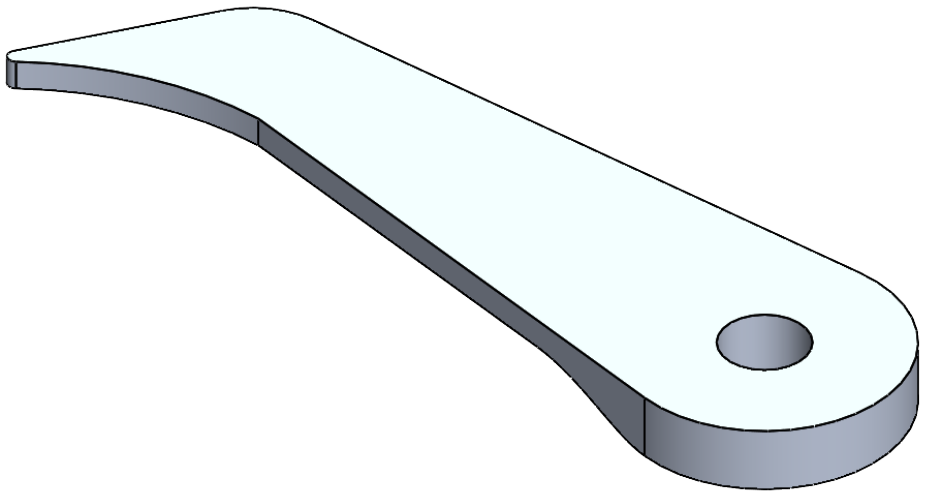
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Faceplate



KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
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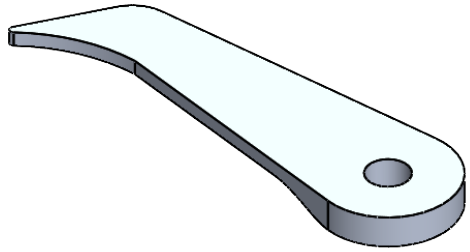
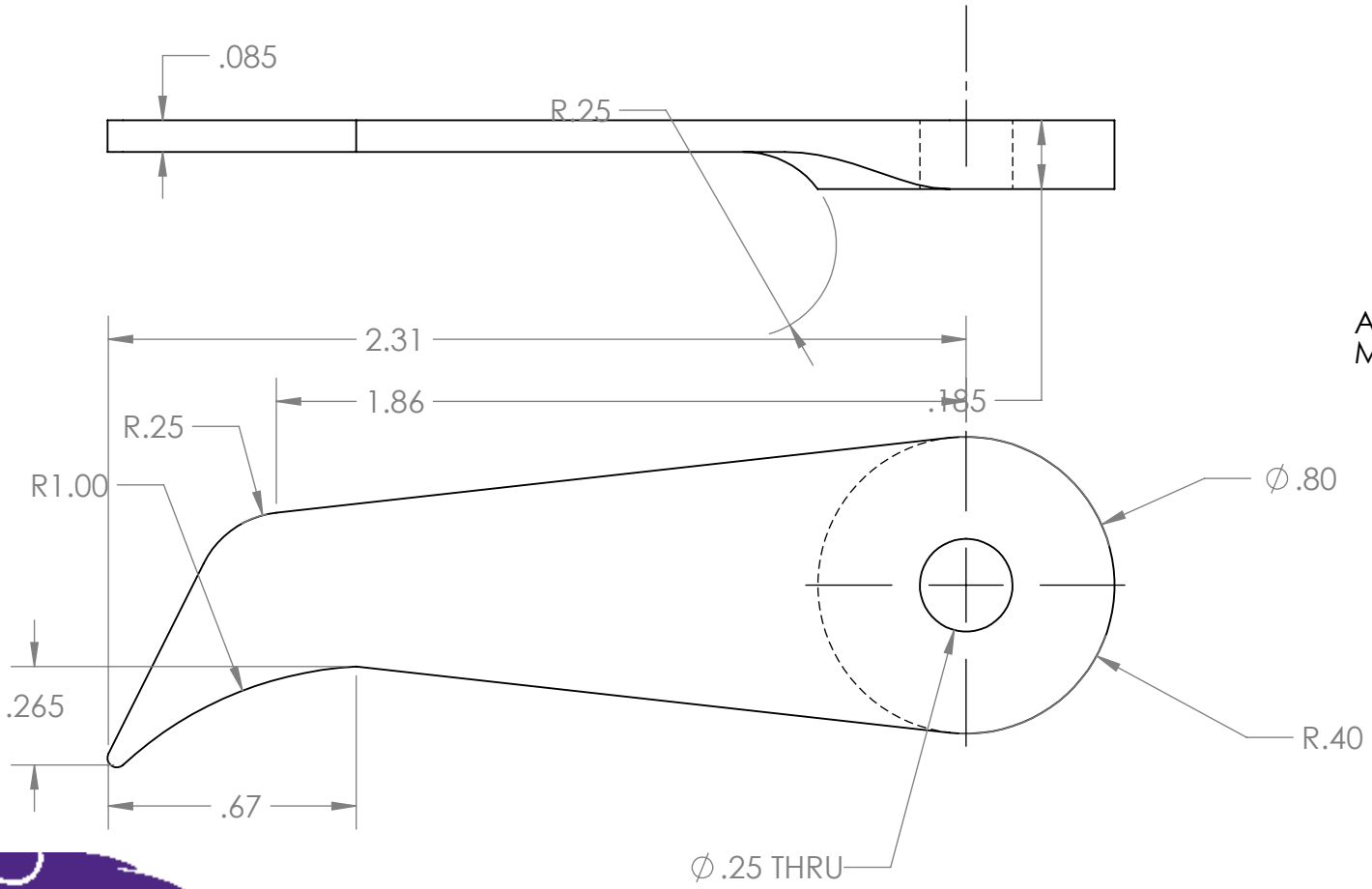
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Pawl





ALL DIMENSIONS ARE
MADE BEFORE FILLETS

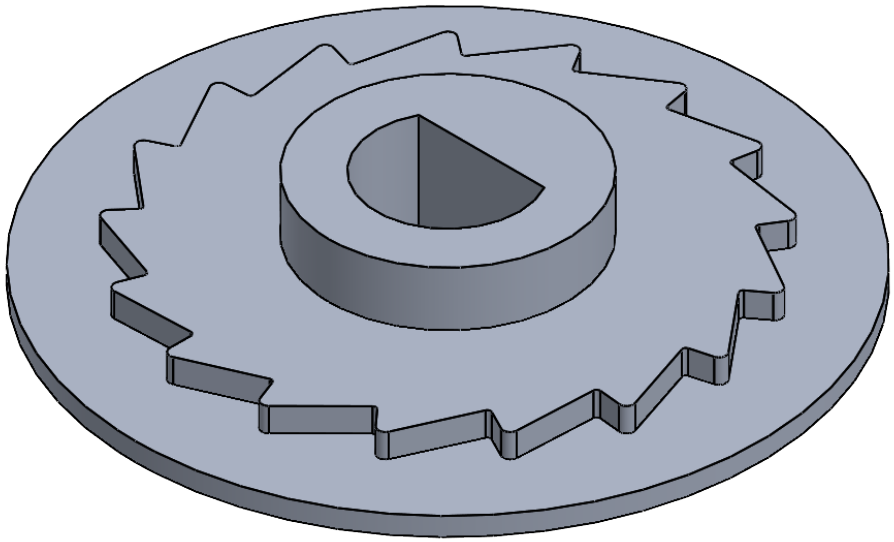
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 0.02 lbs	.X: ±0.1
VOLUME: 0.18 in^3	.XX: ±0.05
MATERIAL: 2014 Alloy	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Pawl



KANSAS STATE UNIVERSITY
College of Engineering

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EiD: atonovitz

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PART NAME:
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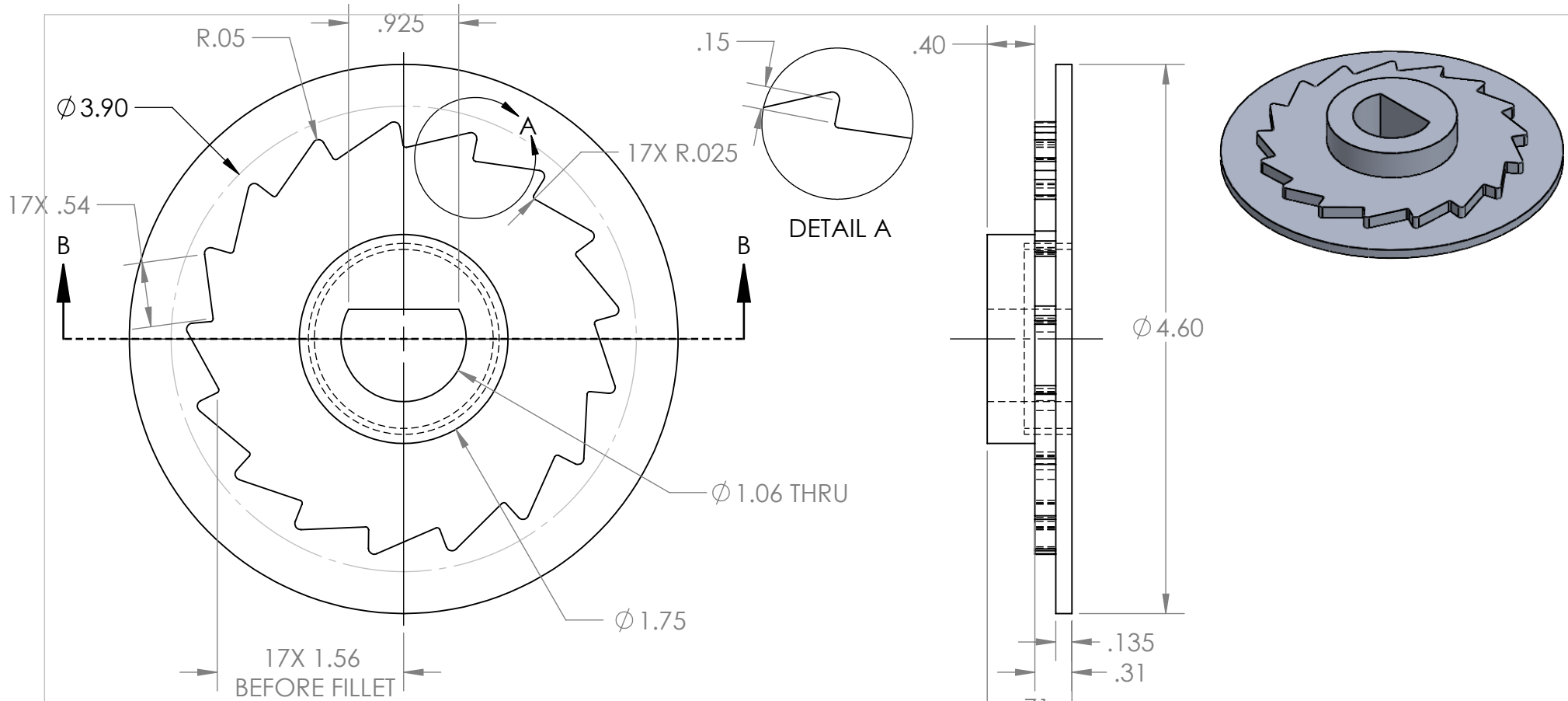

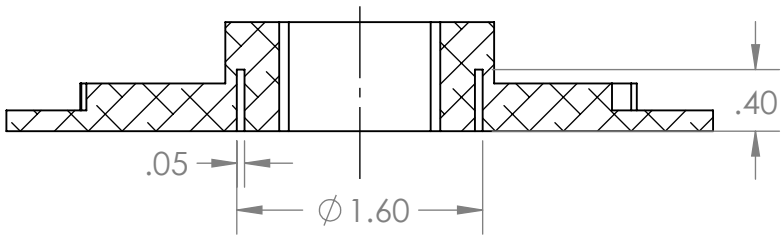

SECTION B-B
SCALE 1 : 1.25

KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
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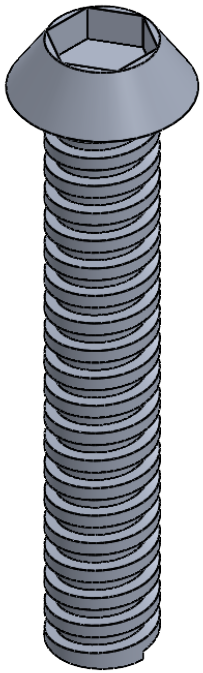
VOLUME: 4.22 in^3	.XX: ±0.05
MATERIAL: 2014 Alloy	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
Ratchet Gear



KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
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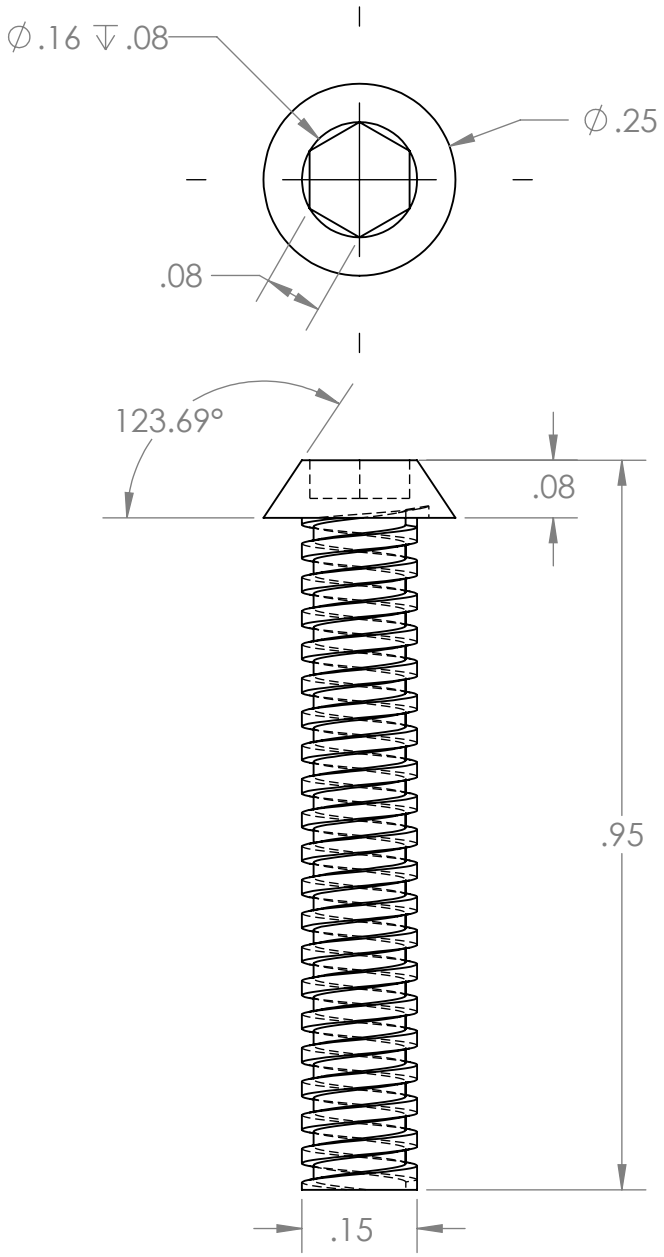
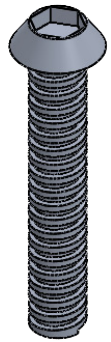
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Screw





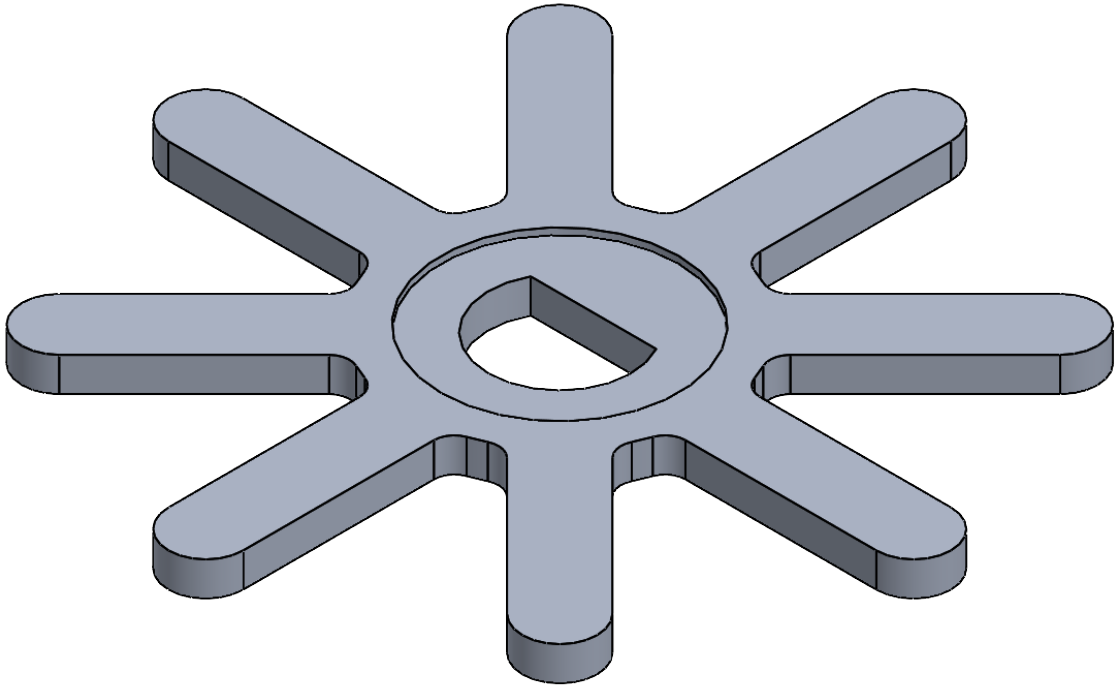
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 0.00 lbs	.X: ±0.1
VOLUME: 0.01 in^3	.XX: ±0.05
MATERIAL: 1060 Alloy	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Screw



KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
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EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

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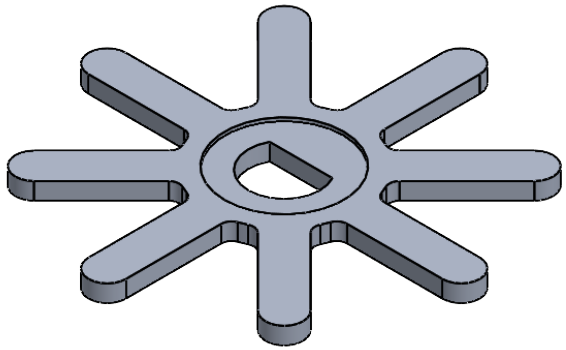
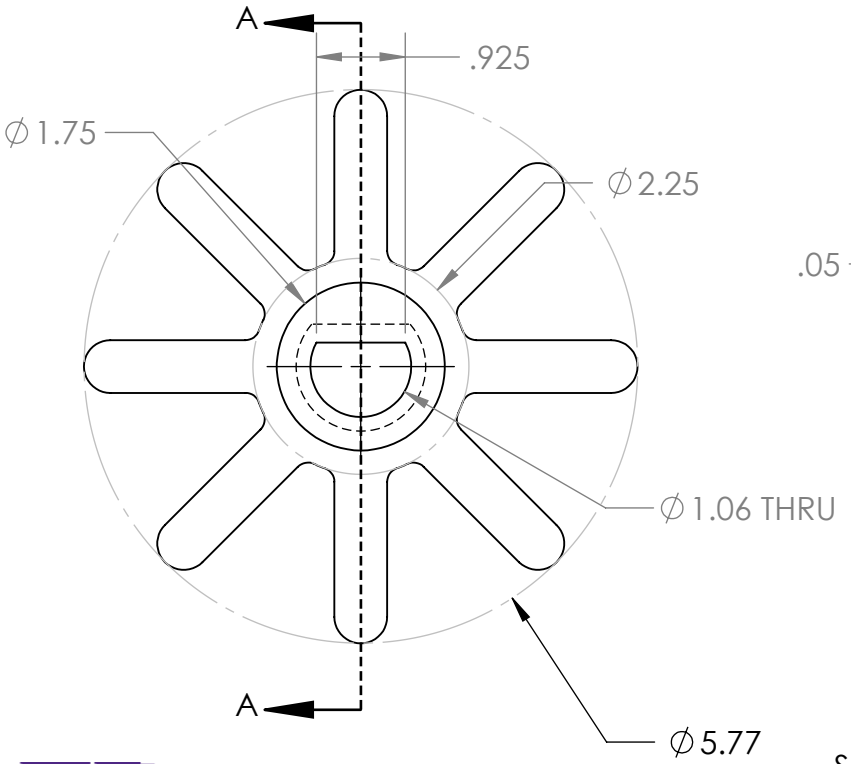
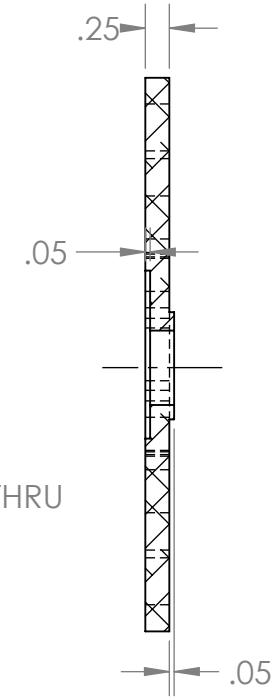
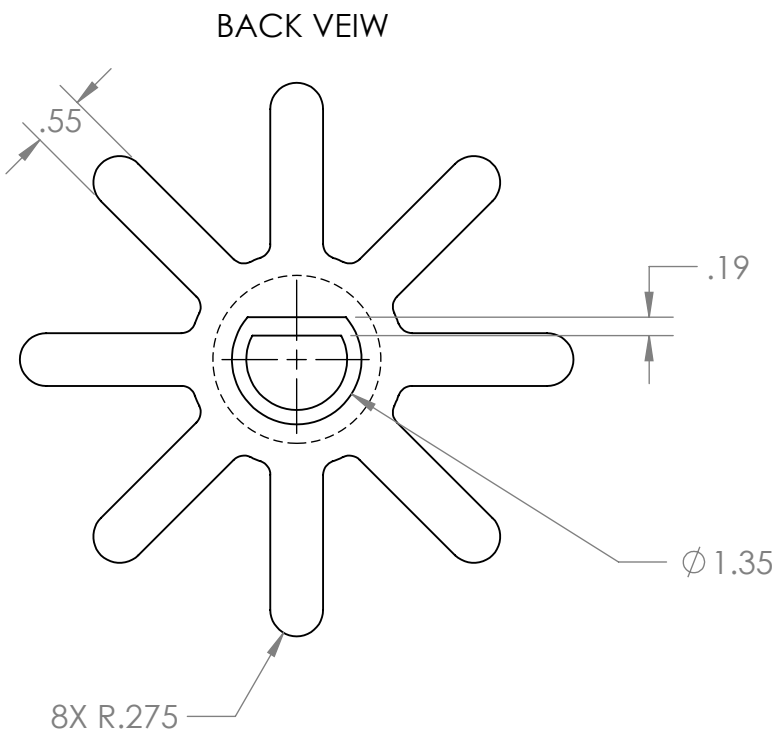






SECTION A-A



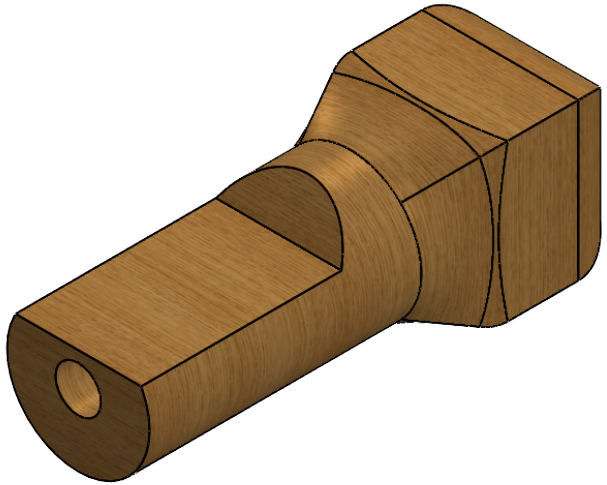
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 0.27 lbs	.X: ±0.1
VOLUME: 2.66 in^3	.XX: ±0.05
MATERIAL: 2014 Alloy	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Spur gear



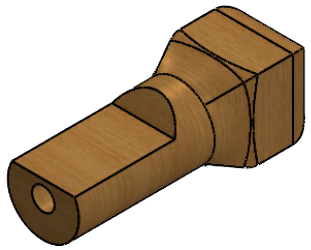
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 0.06 lbs	.X: ±0.1
VOLUME: 3.01 in^3	.XX: ±0.05
MATERIAL: Oak	.XXX: ±0.001

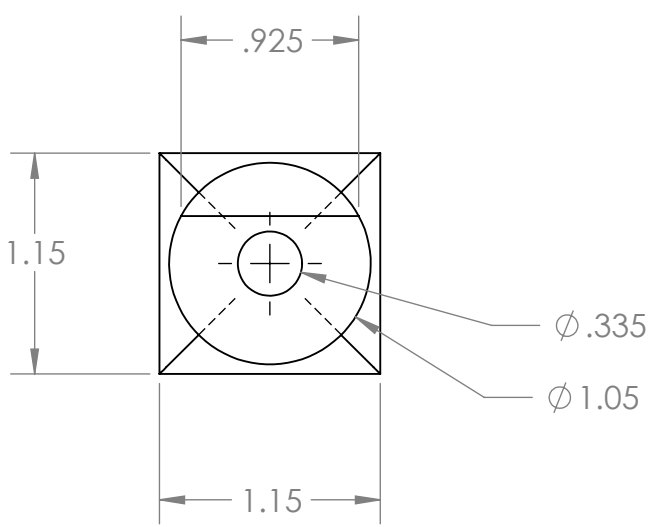
EiD: atonovitz

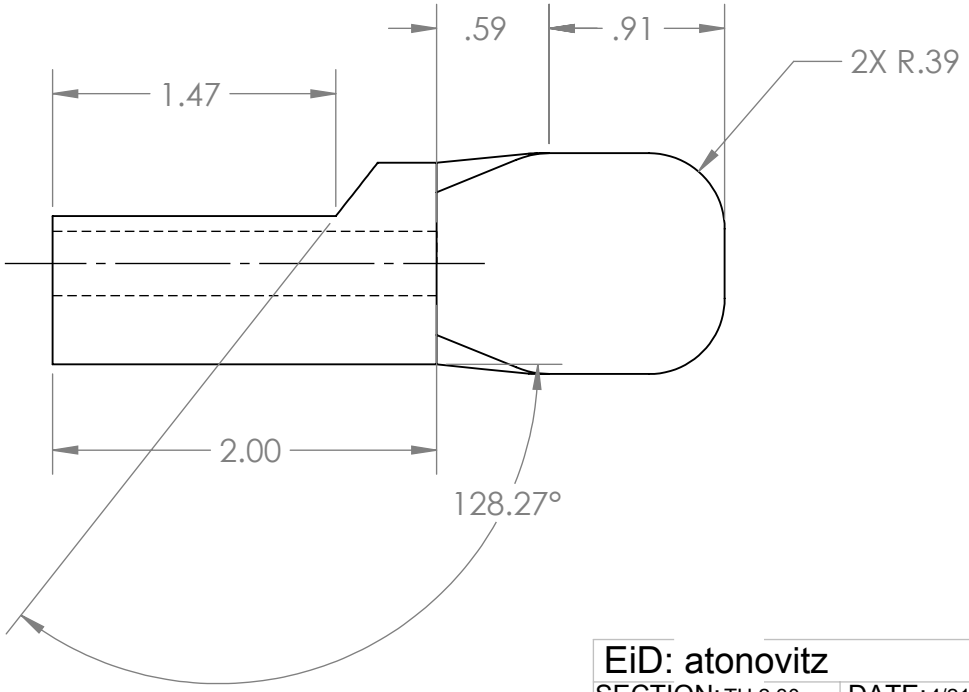
SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Turn Handle



LOFT FROM CIRCLE
TO SQUARE

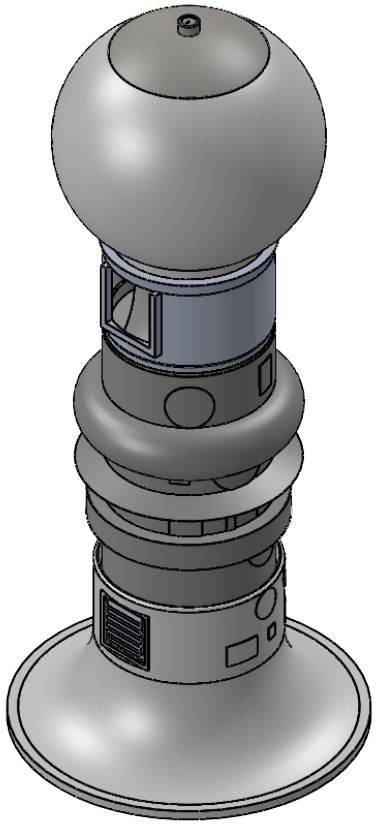




KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 0.06 lbs	.X: ±0.1
VOLUME: 3.01 in^3	.XX: ±0.05
MATERIAL: Oak	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
Turn Handle



KANSAS STATE UNIVERSITY
College of Engineering

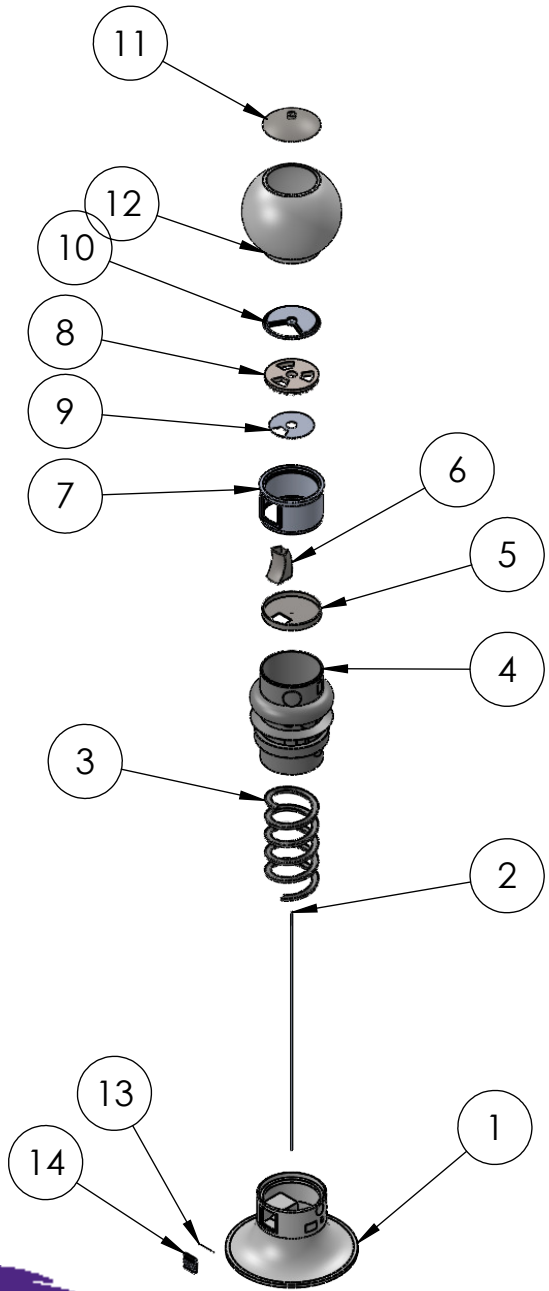
DESIGNER: AUSTIN TONOVITZ

EiD: atonovitz

SECTION: TU 2:30 DATE: 4/21/2024

ASSEMBLY NAME:
Structure assembly

SHEET 1 OF 2 PAGE 28 OF 57



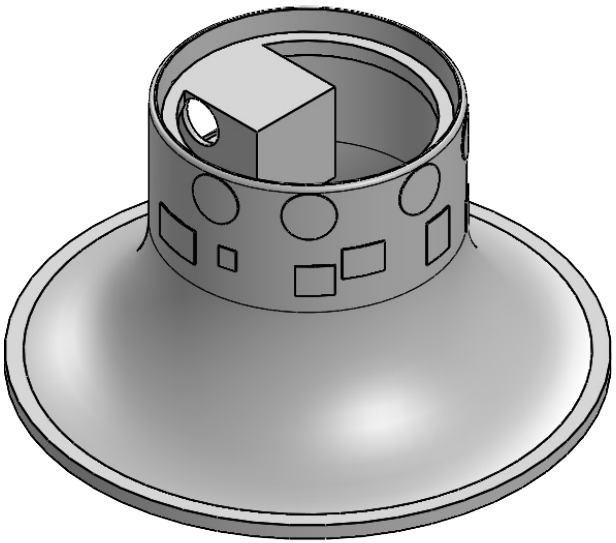
ITEM NO.	PART NAME	QTY.
1	Base	1
2	Center rod	1
3	gumball path	1
4	shaft	1
5	coin collection dish	1
6	Chute	1
7	head	1
8	Dispensing disk	1
9	seperator	1
10	Seperator top	1
11	lid	1
12	Globe	1
13	Door Attatchment	1
14	Door	1

KANSAS STATE UNIVERSITY
College of Engineering

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
ASSEMBLY NAME:
Structure assembly

DESIGNER: AUSTIN TONOVITZ

SHEET 2 OF 2 PAGE 29 OF 57



KANSAS STATE UNIVERSITY
College of Engineering

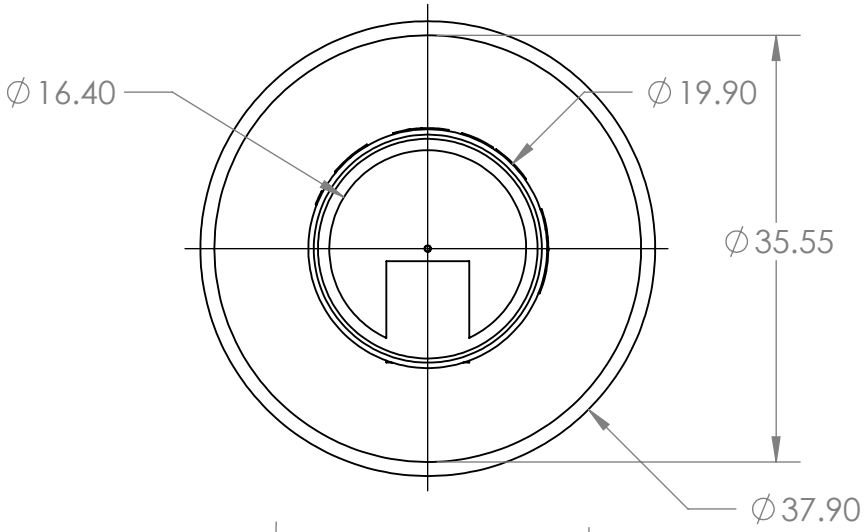
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 88.30 lbs	.X: ±0.1
VOLUME: 2396.19 in^3	.XX: ±0.05
MATERIAL: ABS	.XXX: ±0.001

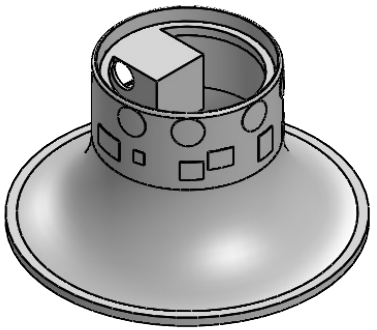
EiD: atonovitz

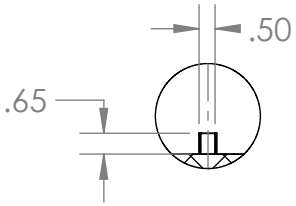
SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Base

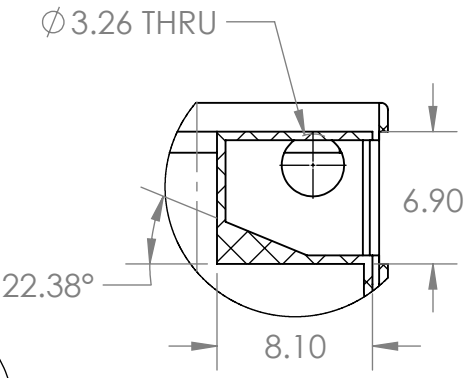
HIDDEN LINES
REMOVED FOR CLARITY



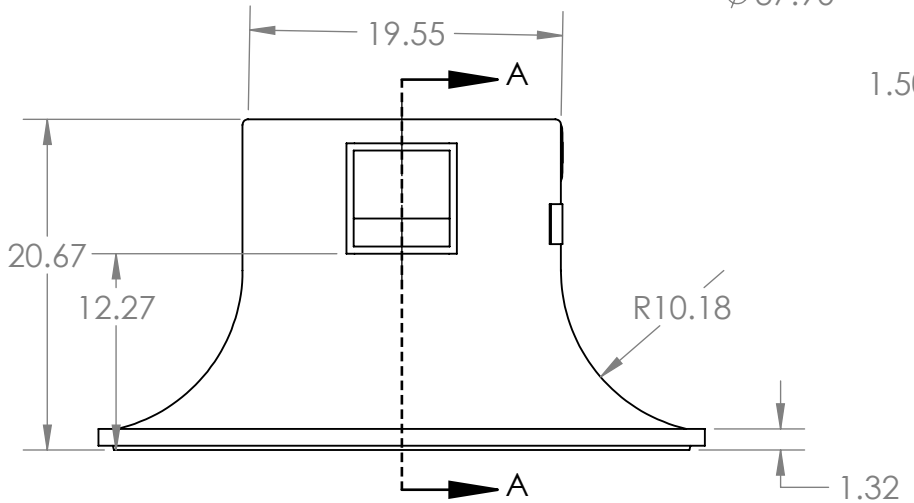


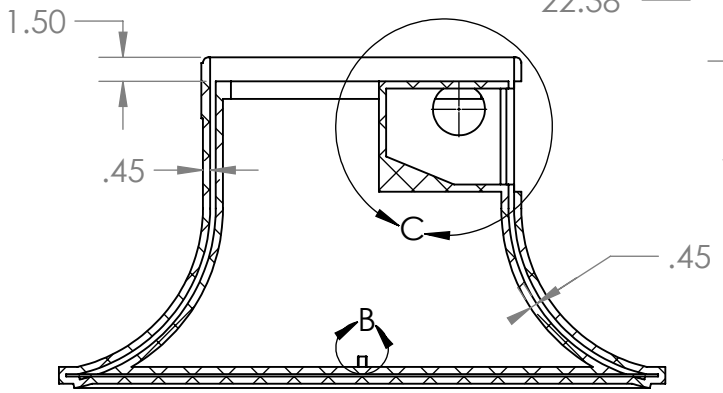


DETAIL B
SCALE 1 : 6



DETAIL C
SCALE 1 : 10





SECTION A-A
SCALE 1 : 12

KANSAS STATE UNIVERSITY
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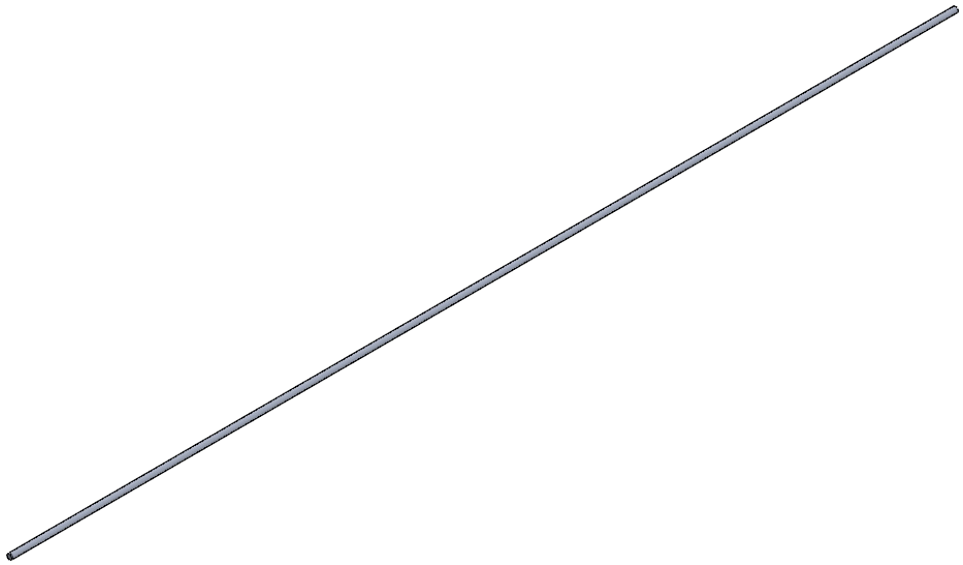
DESIGNER:	DEFAULT TOLERANCES: (IN)
MASS: 88.30 lbs	.X: ±0.1
VOLUME: 2396.19 in^3	.XX: ±0.05
MATERIAL: ABS	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 | DATE: 4/21/2024
PART NAME:
Base



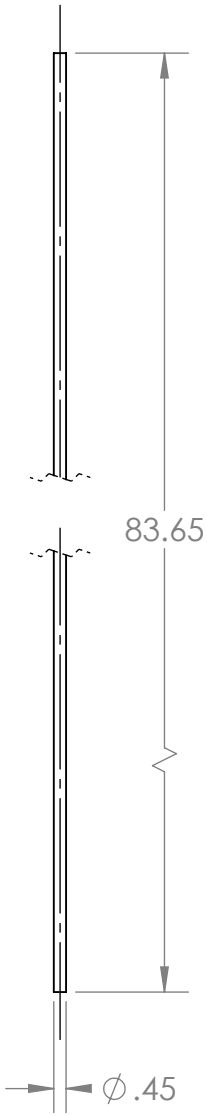
KANSAS STATE UNIVERSITY
College of Engineering

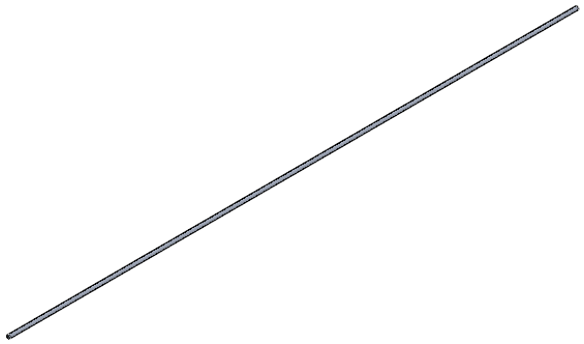
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 1.30 lbs	.X: ± 0.1
VOLUME: 13.30 in^3	.XX: ± 0.05
MATERIAL: 1060 Alloy	.XXX: ± 0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Center rod





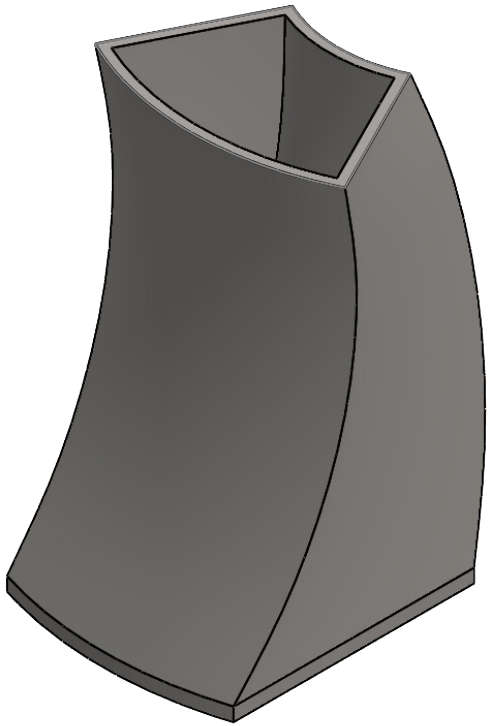
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER:	DEFAULT TOLERANCES: (IN)
MASS: 1.30 lbs	.X: ±0.1
VOLUME: 13.30 in^3	.XX: ±0.05
MATERIAL: 1060 Alloy	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Center rod



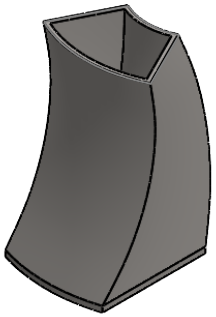
KANSAS STATE UNIVERSITY
College of Engineering

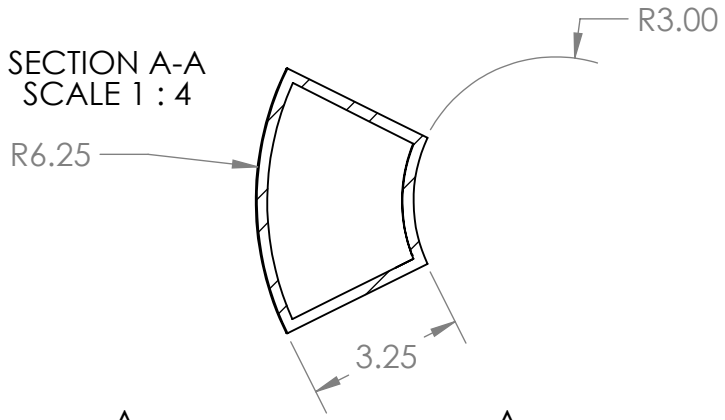
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 39.08 lbs	.X: ±0.1
VOLUME: 136.94 in^3	.XX: ±0.05
MATERIAL: AISI 1020	.XXX: ±0.001

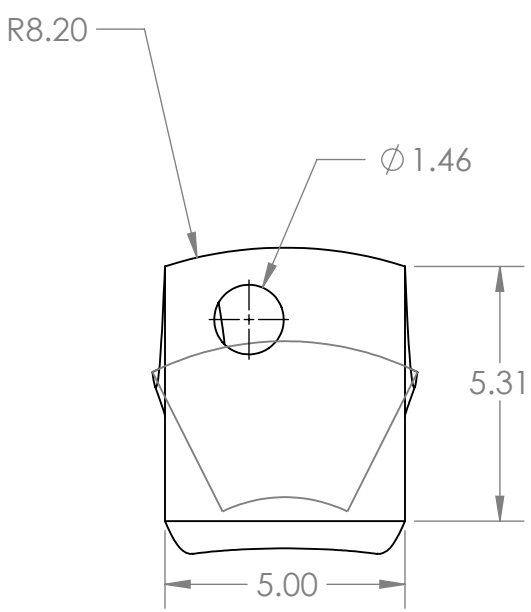
EiD: atonovitz

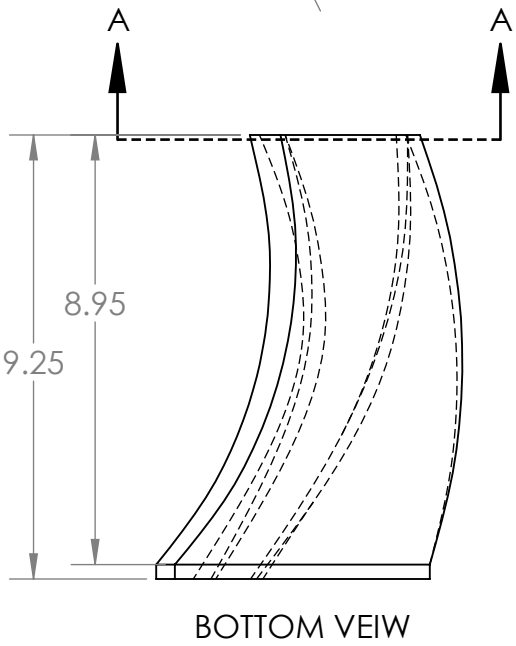
SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Chute









BOTTOM VEIW

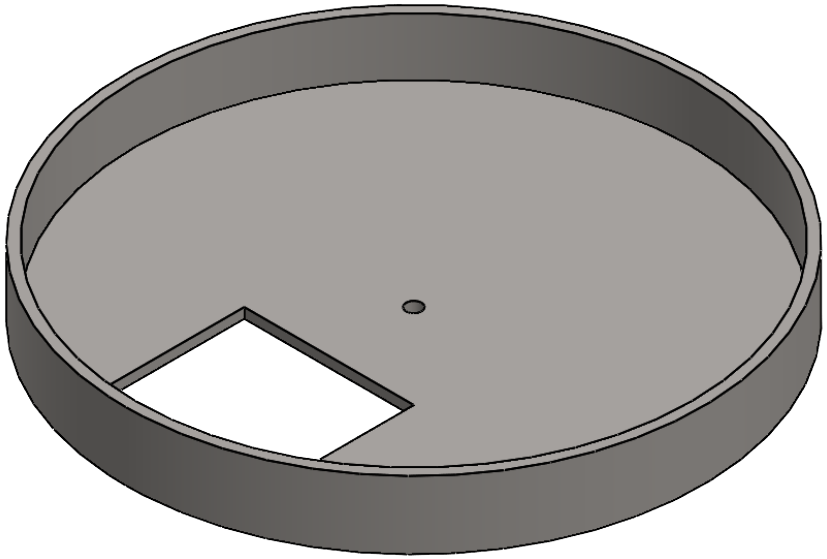
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 39.08 lbs	.X: ±0.1
VOLUME: 136.94 in^3	.XX: ±0.05
MATERIAL: AISI 1020	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Chute



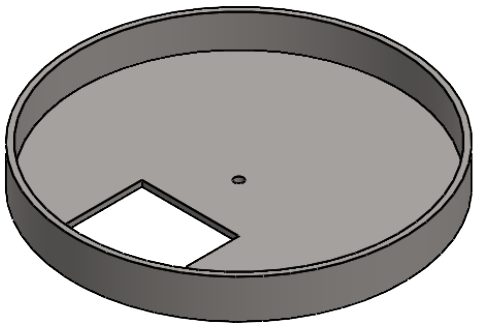
KANSAS STATE UNIVERSITY
College of Engineering

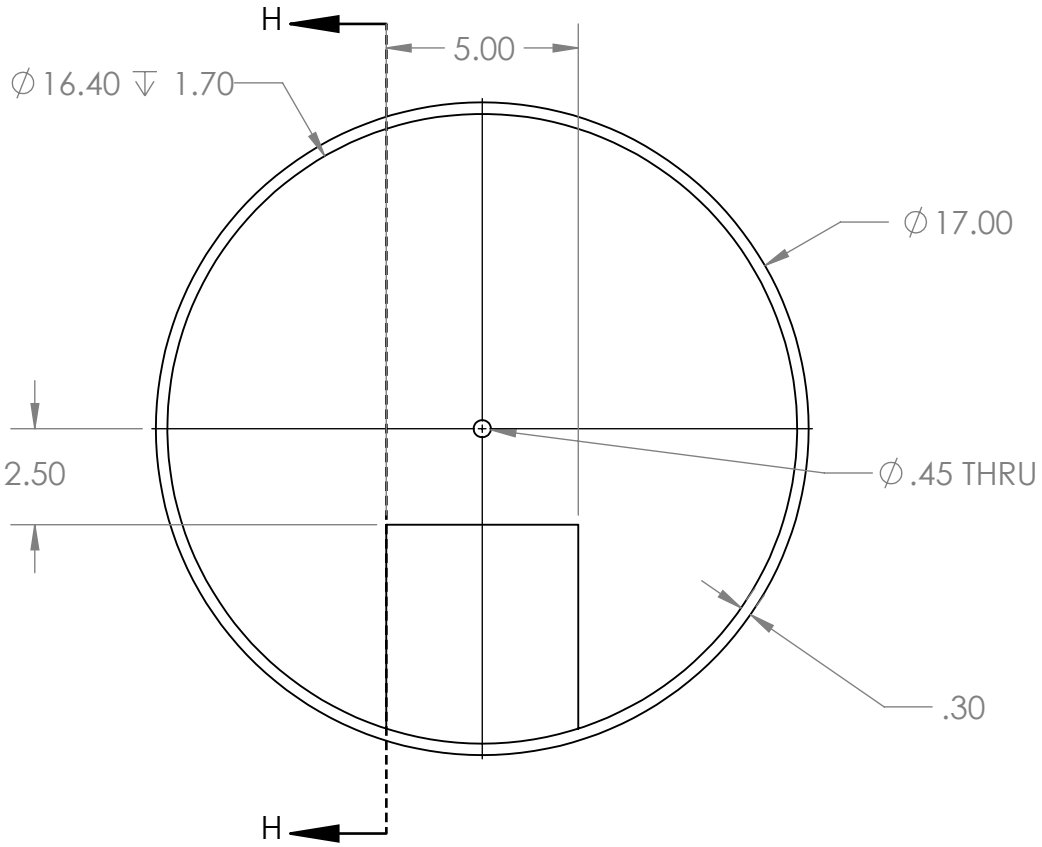
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 24.67 lbs	.X: ±0.1
VOLUME: 86.45 in^3	.XX: ±0.05
MATERIAL: AISI 1020	.XXX: ±0.001

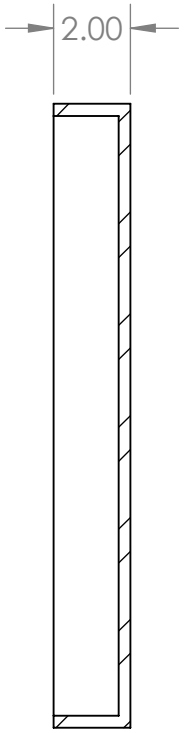
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
coin collection dish





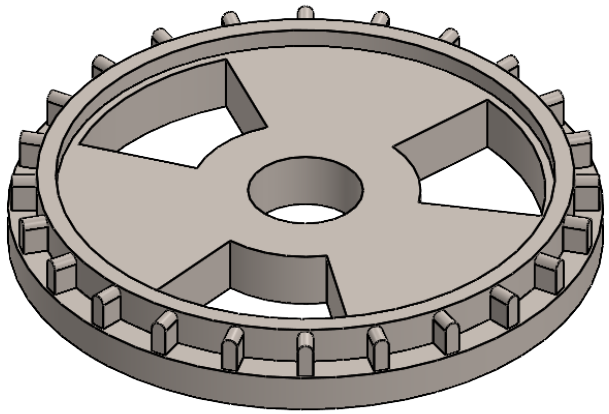


SECTION H-H
SCALE 1 : 5

KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 24.67 lbs	.X: ±0.1
VOLUME: 86.45 in^3	.XX: ±0.05
MATERIAL: AISI 1020	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
coin collection dish



KANSAS STATE UNIVERSITY
College of Engineering

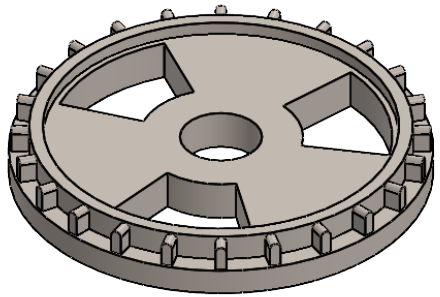
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 58.61 lbs	.X: ±0.1
VOLUME: 210.70 in^3	.XX: ±0.05
MATERIAL: Alloy Steel	.XXX: ±0.001

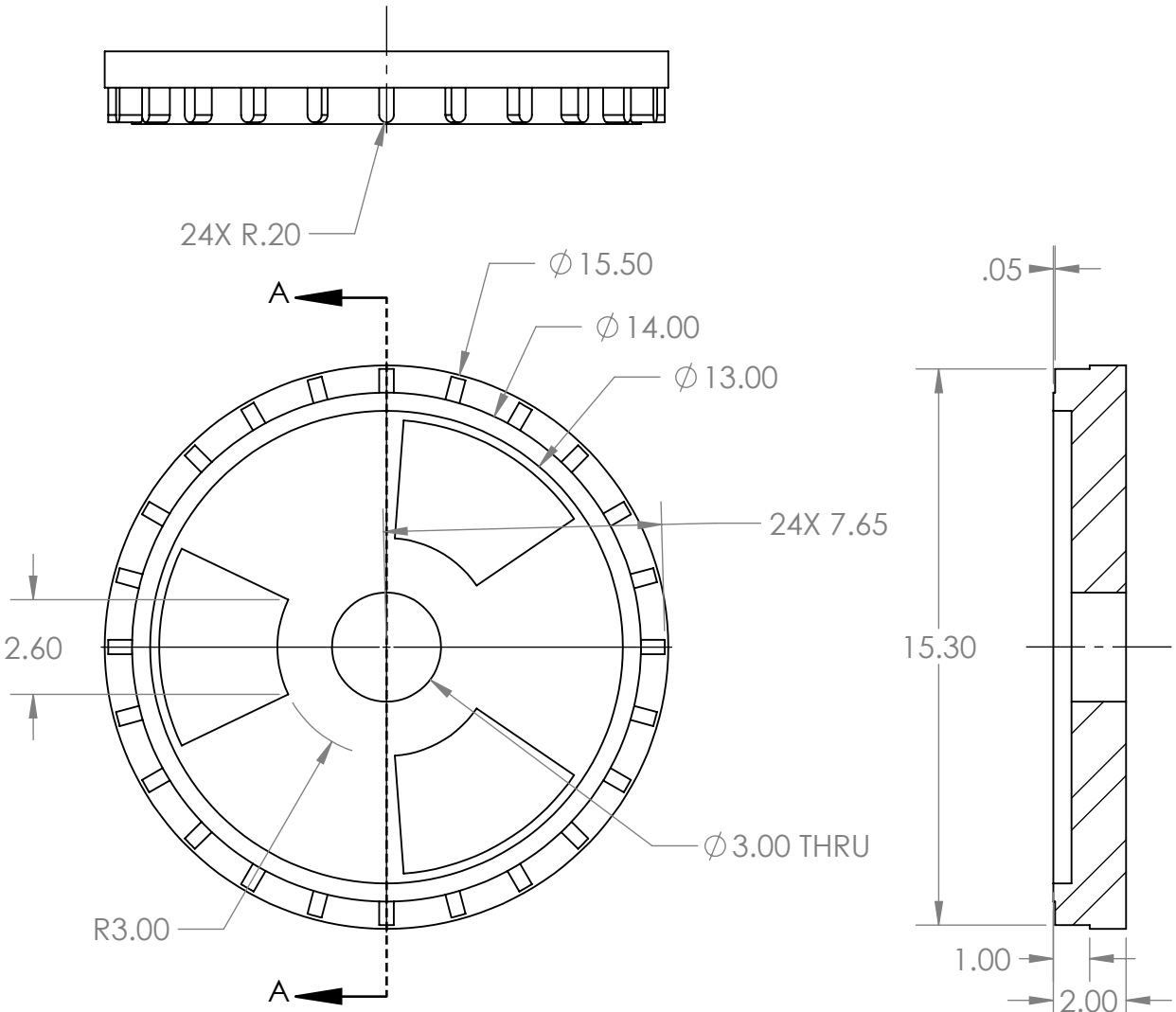
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Dispensing disk

HIDDEN LINES REMOVED FROM
FRONT VEIW FOR CLARITY



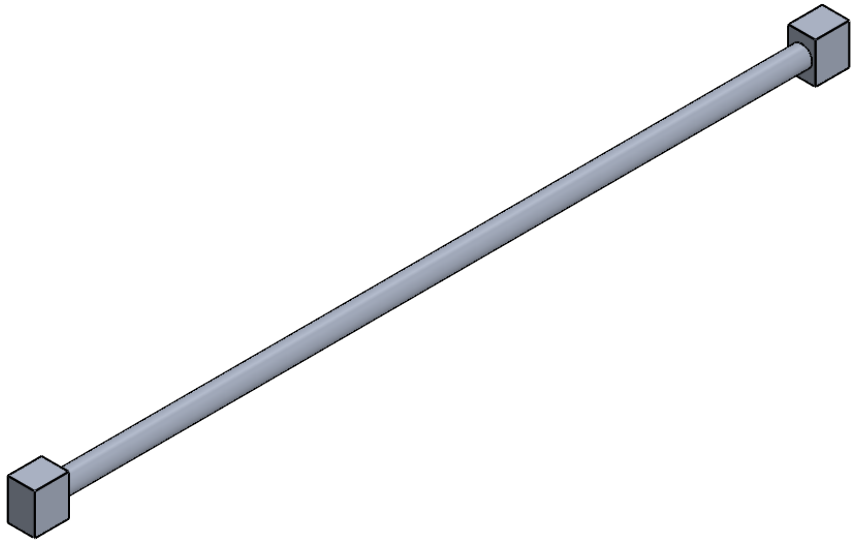


SECTION A-A
SCALE 1 : 5

KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 58.61 lbs	.X: ±0.1
VOLUME: 210.70 in^3	.XX: ±0.05
MATERIAL: Alloy Steel	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 | DATE: 4/21/2024
PART NAME:
Dispensing disk



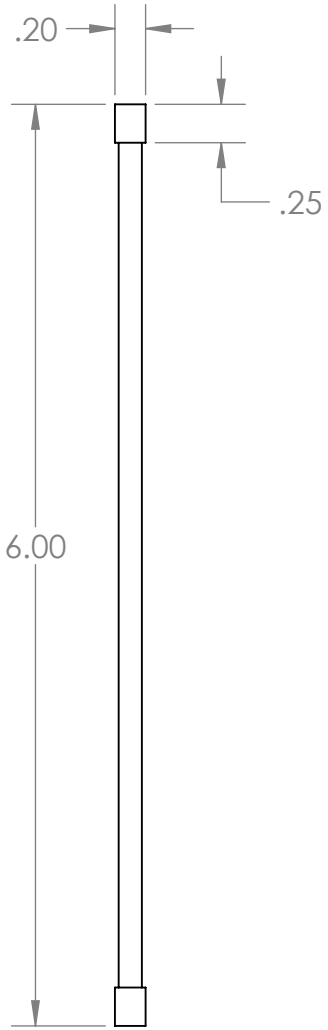
KANSAS STATE UNIVERSITY
College of Engineering

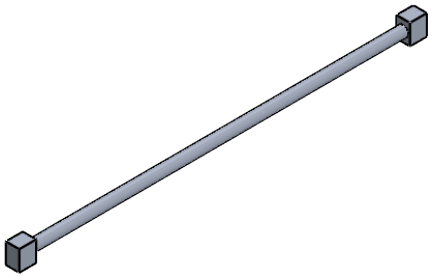
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 0.01 lbs	.X: ±0.1
VOLUME: 0.13 in^3	.XX: ±0.05
MATERIAL: 1350 Alloy	.XXX: ±0.001

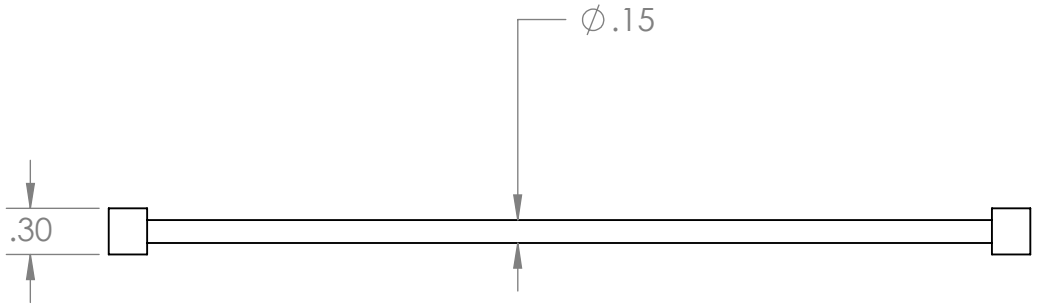
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Door Attatchment



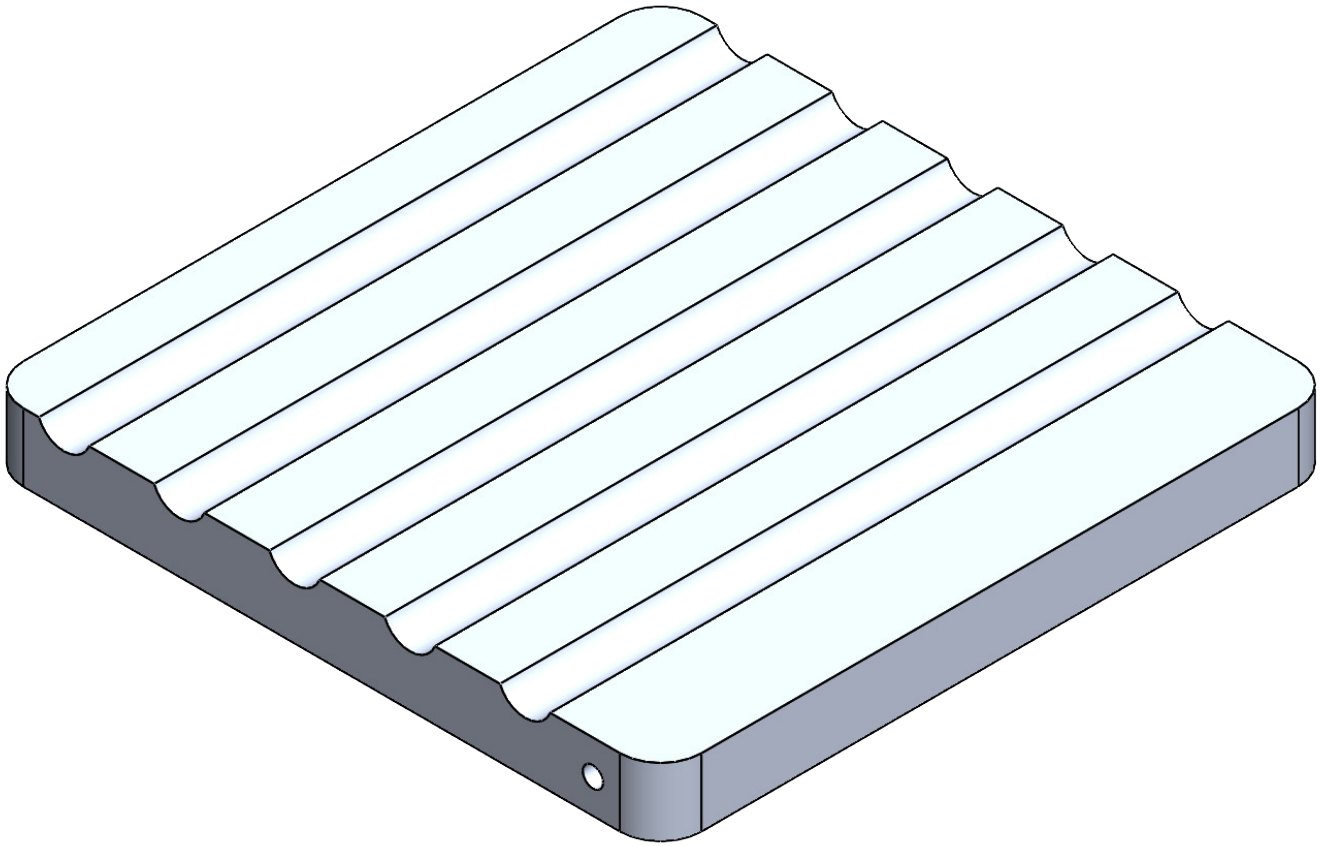




KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 0.01 lbs	.X: ±0.1
VOLUME: 0.13 in^3	.XX: ±0.05
MATERIAL: 1350 Alloy	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
Door Attatchment



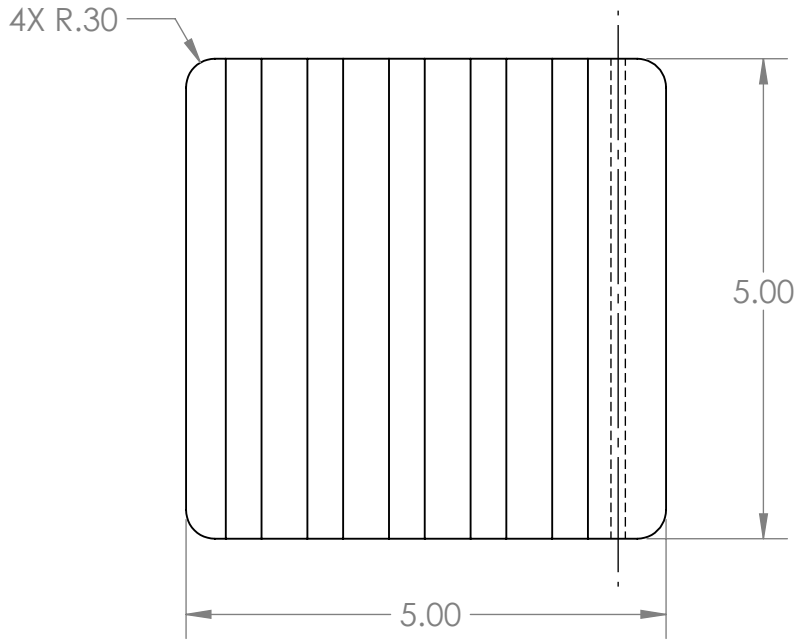
KANSAS STATE UNIVERSITY
College of Engineering

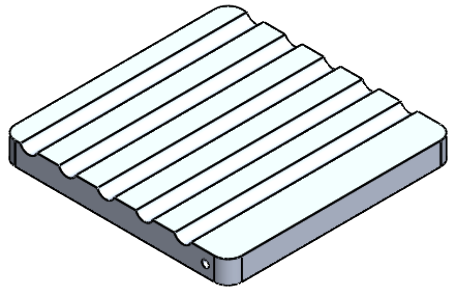
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 1.13 lbs	.X: ±0.1
VOLUME: 11.53 in^3	.XX: ±0.05
MATERIAL: 1350 Alloy	.XXX: ±0.001

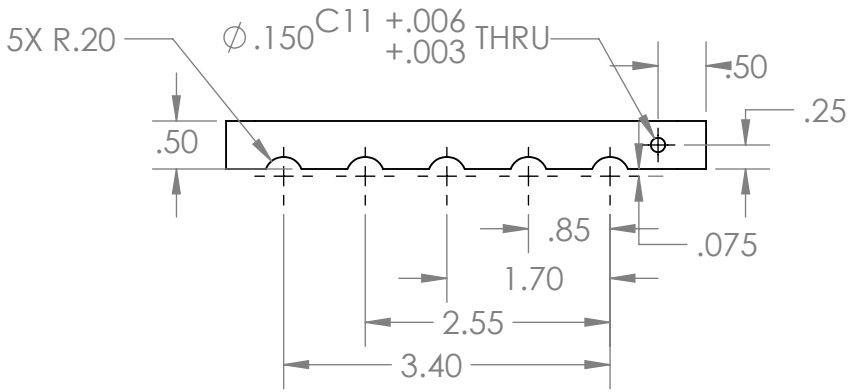
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Door







KANSAS STATE UNIVERSITY
College of Engineering

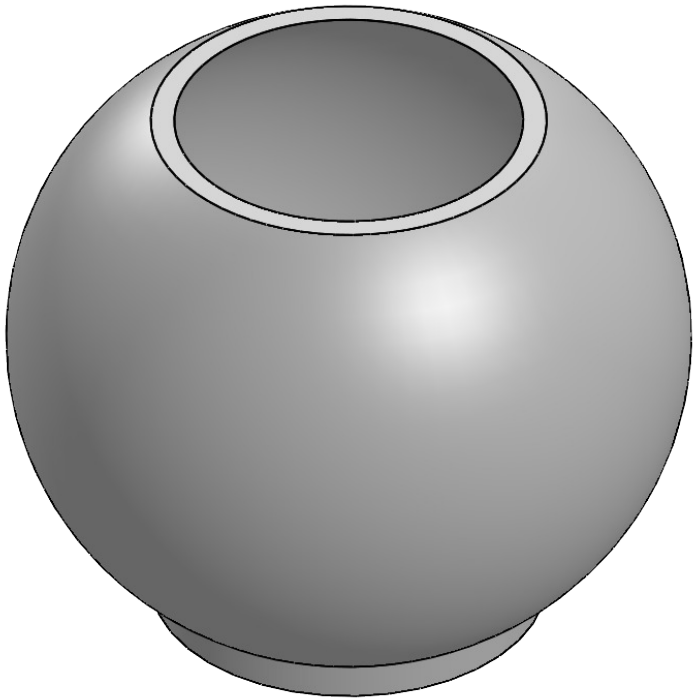
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 1.13 lbs	.X: ±0.1
VOLUME: 11.53 in^3	.XX: ±0.05
MATERIAL: 1350 Alloy	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Door

SHEET 2 OF 2 PAGE 43 OF 57



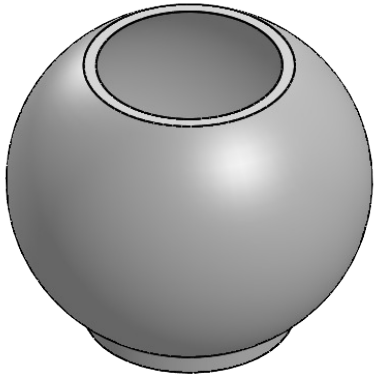
KANSAS STATE UNIVERSITY
College of Engineering

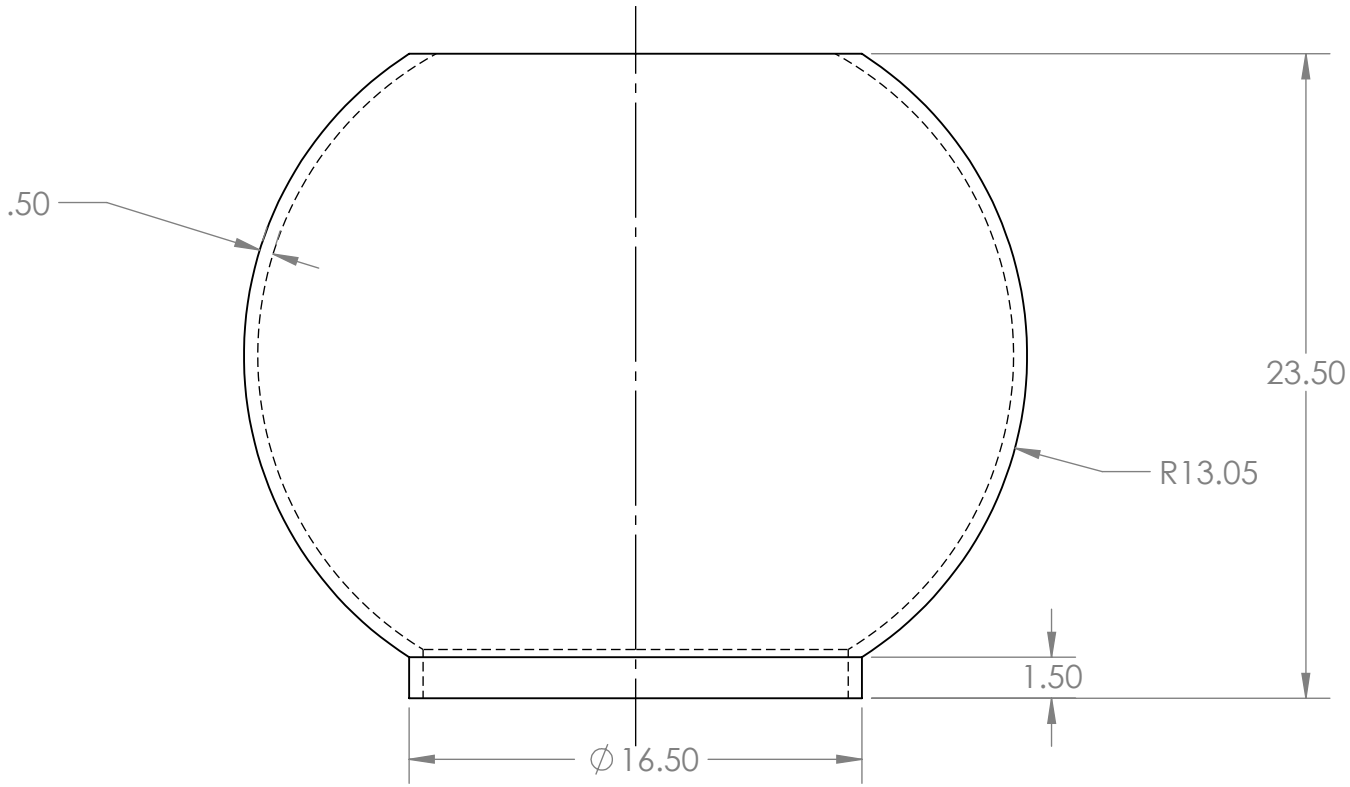
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 37.64 lbs	.X: ±0.1
VOLUME: 1021.44 in^3	.XX: ±0.05
MATERIAL: ABS	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Globe





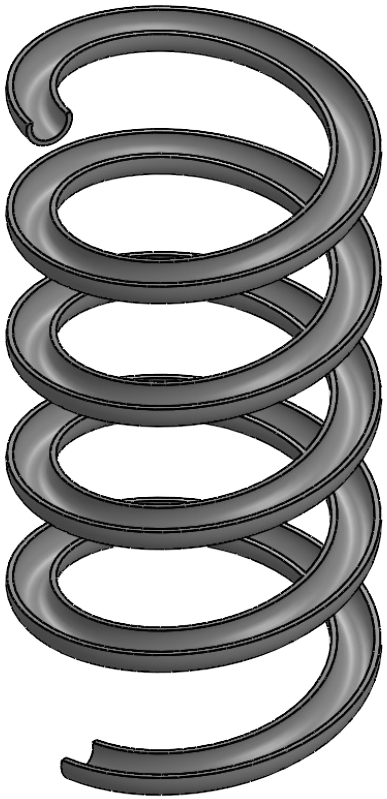
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 37.64 lbs	.X: ±0.1
VOLUME: 1021.44 in^3	.XX: ±0.05
MATERIAL: ABS	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

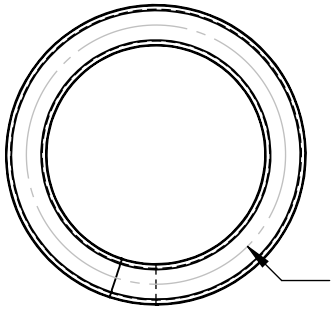
PART NAME:
Globe

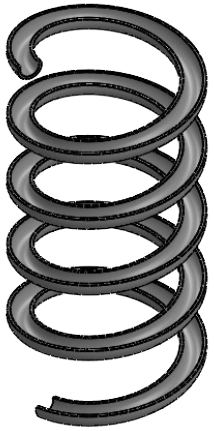


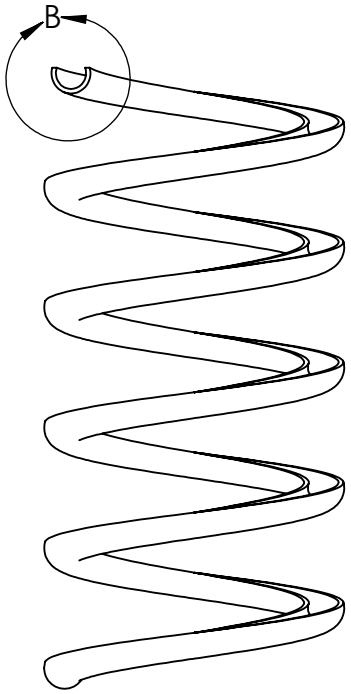
KANSAS STATE UNIVERSITY
College of Engineering

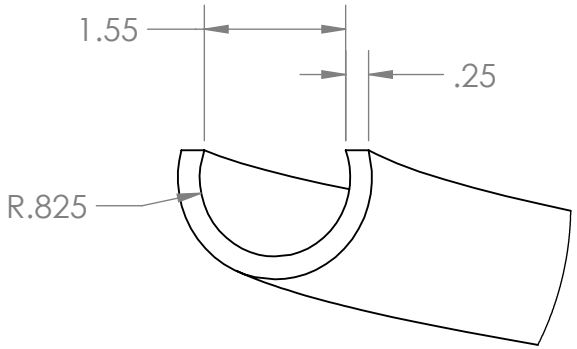
DESIGNER:	DEFAULT TOLERANCES: (IN)
MASS: 6.53 lbs	.X: ±0.1
VOLUME: 177.13 in^3	.XX: ±0.05
MATERIAL: Custom Plastic	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
gumball path







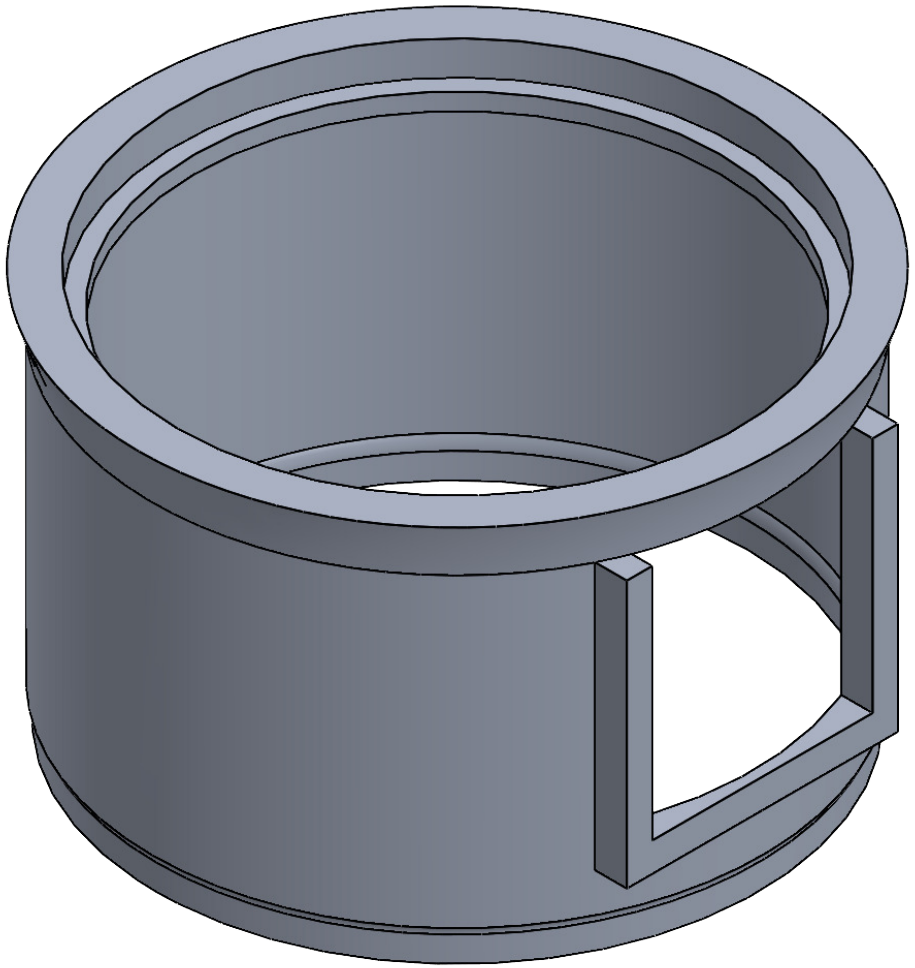


DETAIL B
SCALE 1 : 2

KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 6.53 lbs	.X: ±0.1
VOLUME: 177.13 in^3	.XX: ±0.05
MATERIAL: Custom Plastic	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 | DATE: 4/21/2024
PART NAME:
gumball path



KANSAS STATE UNIVERSITY
College of Engineering

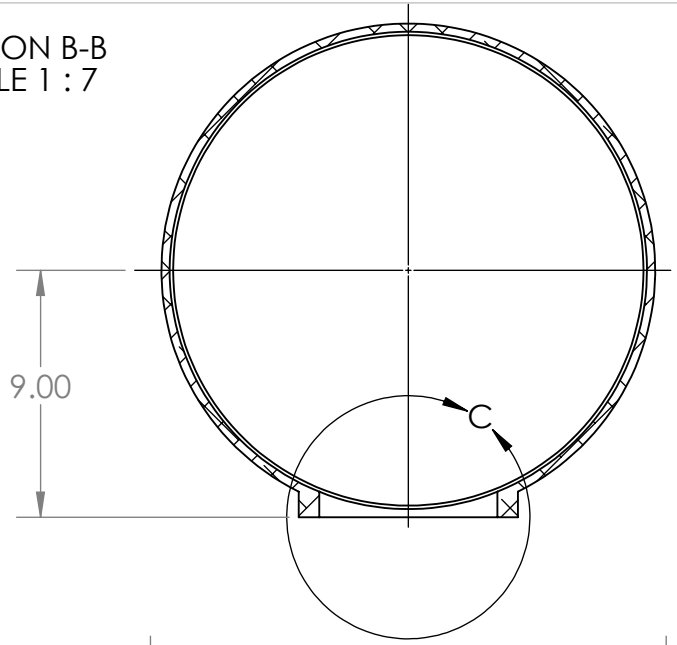
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 24.57 lbs	.X: ±0.1
VOLUME: 251.88 in^3	.XX: ±0.05
MATERIAL: 1060 Alloy	.XXX: ±0.001

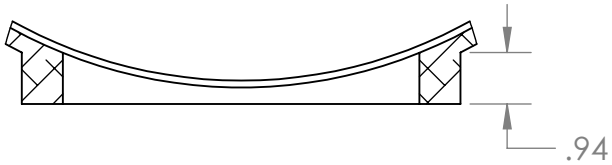
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

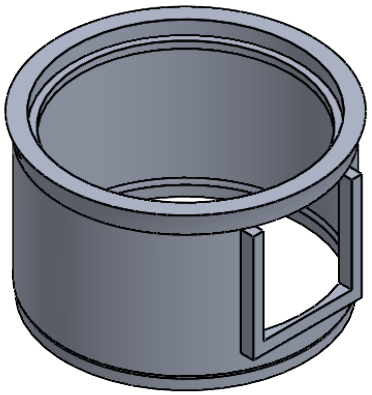
PART NAME:
head

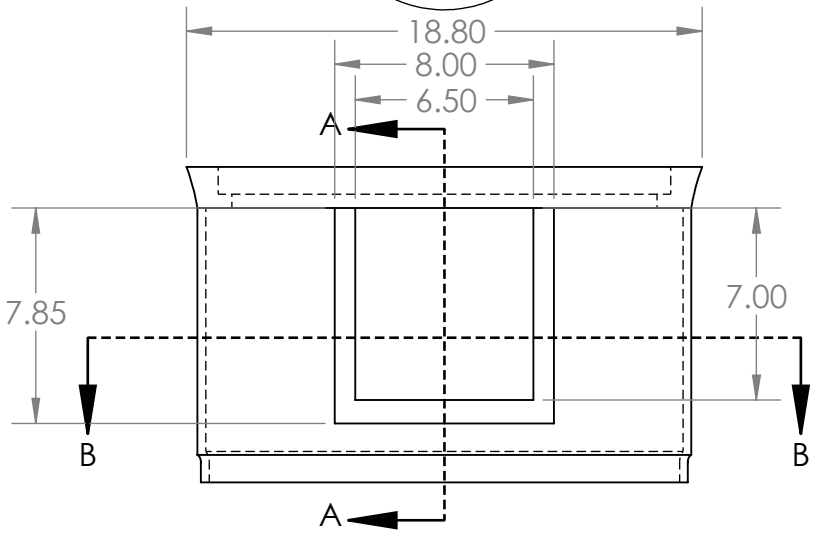
SECTION B-B
SCALE 1 : 7

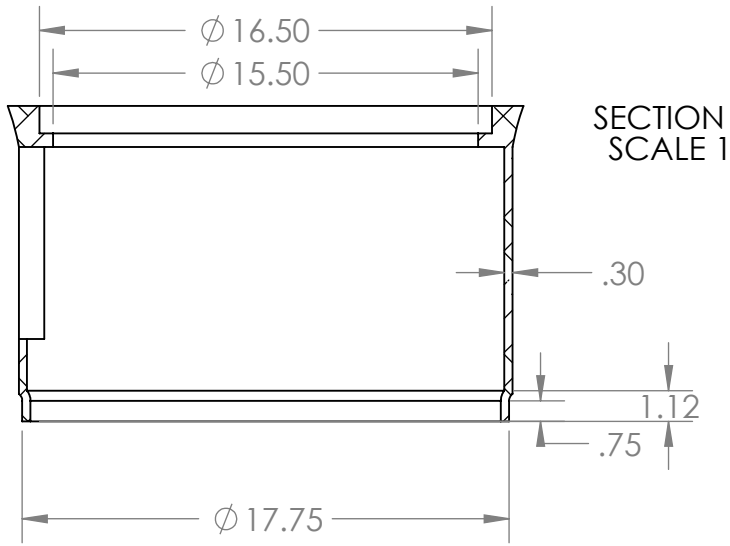




DETAIL C
SCALE 2 : 7





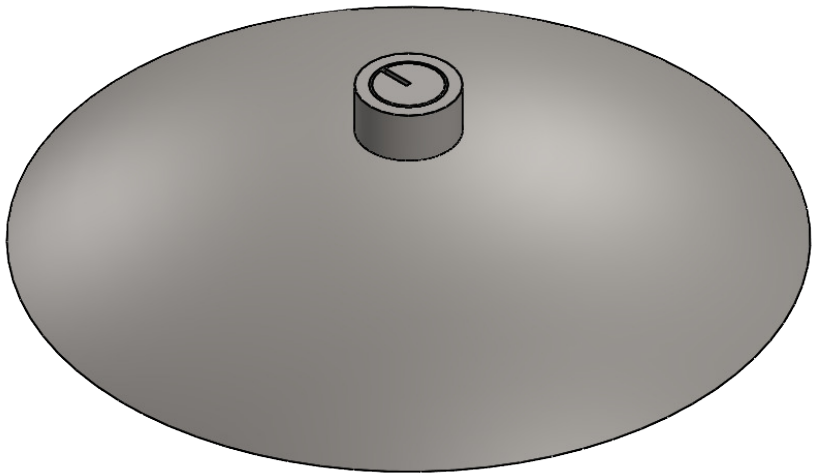


SECTION A-A
SCALE 1 : 7

KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 24.57 lbs	.X: ±0.1
VOLUME: 251.88 in^3	.XX: ±0.05
MATERIAL: 1060 Alloy	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
head



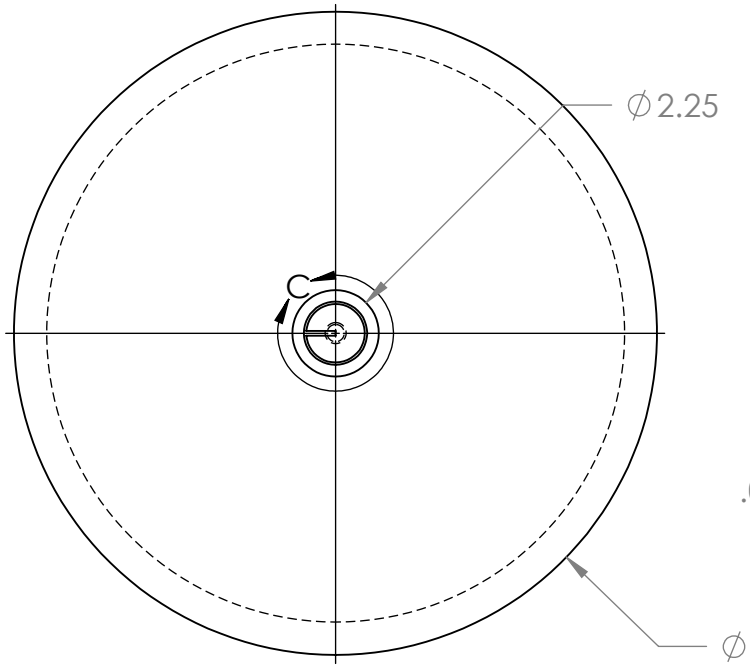
KANSAS STATE UNIVERSITY
College of Engineering

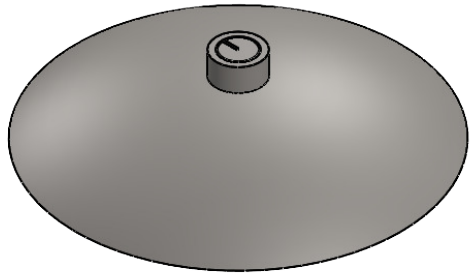
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 40.27 lbs	.X: ±0.1
VOLUME: 141.10 in^3	.XX: ±0.05
MATERIAL: AISI 1020	.XXX: ±0.001

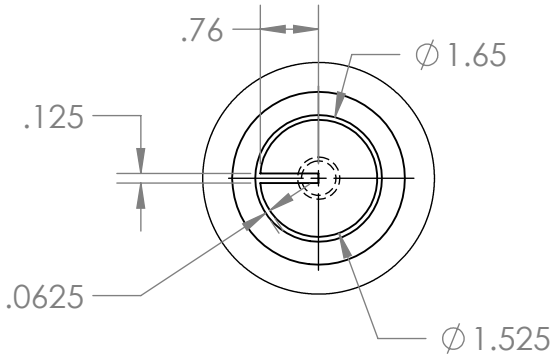
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

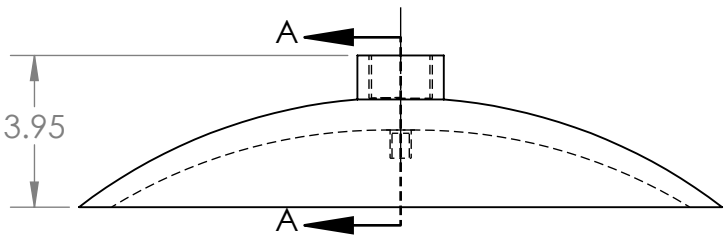
PART NAME:
lid

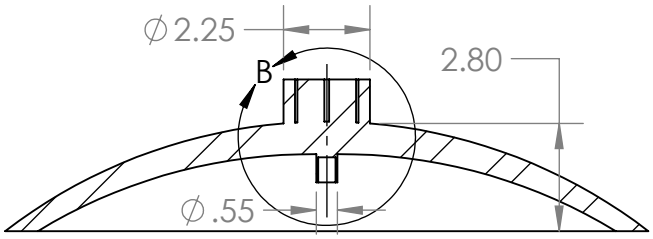




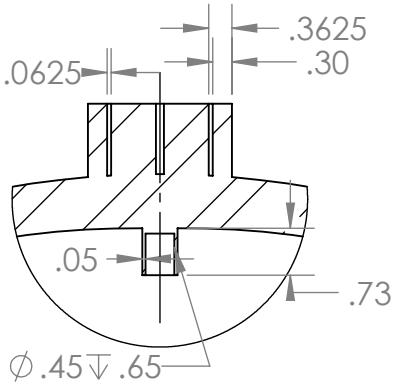


DETAIL C
SCALE 2 : 5





SECTION A-A
SCALE 1 : 5

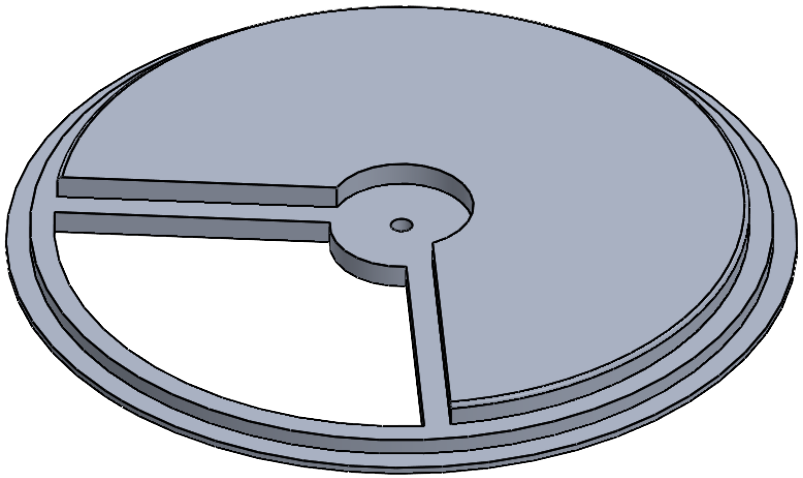


DETAIL B
SCALE 1 : 3

KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 40.27 lbs	.X: ±0.1
VOLUME: 141.10 in^3	.XX: ±0.05
MATERIAL: AISI 1020	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
lid



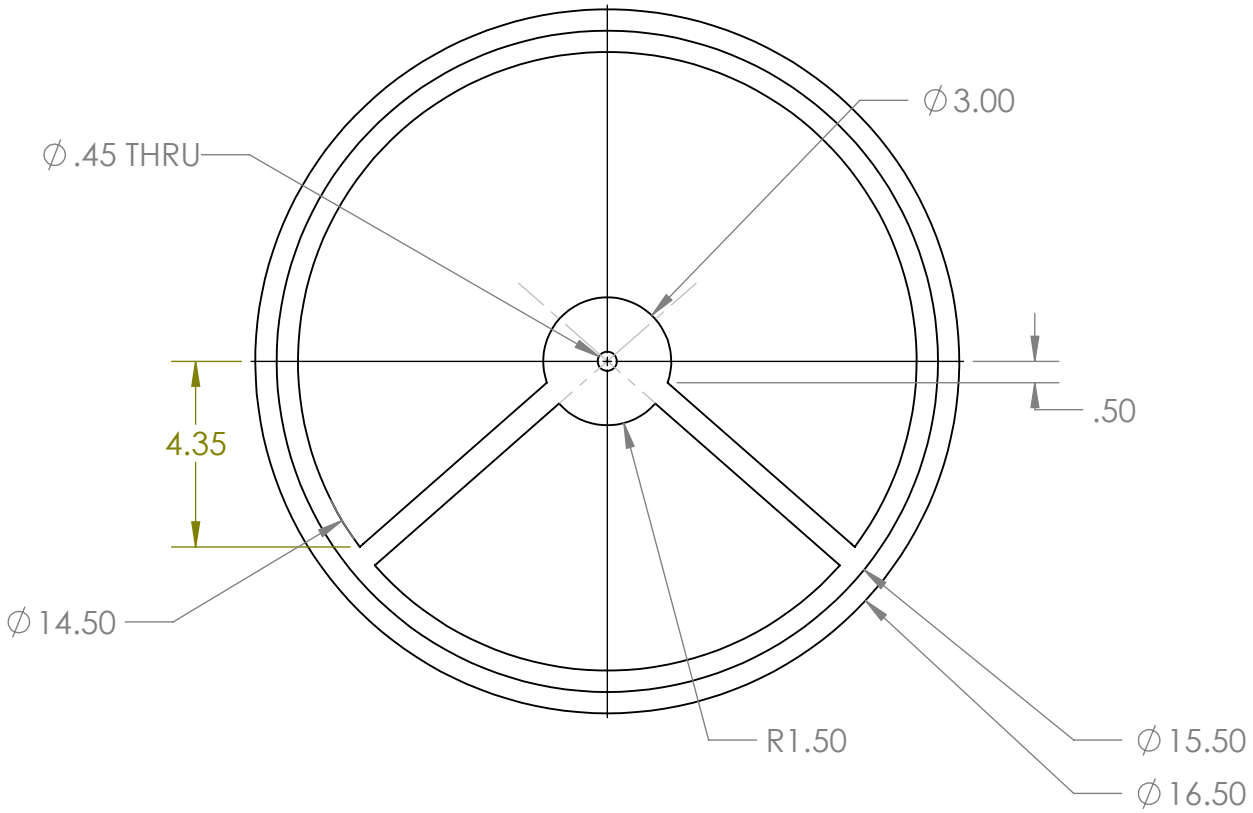
KANSAS STATE UNIVERSITY
College of Engineering

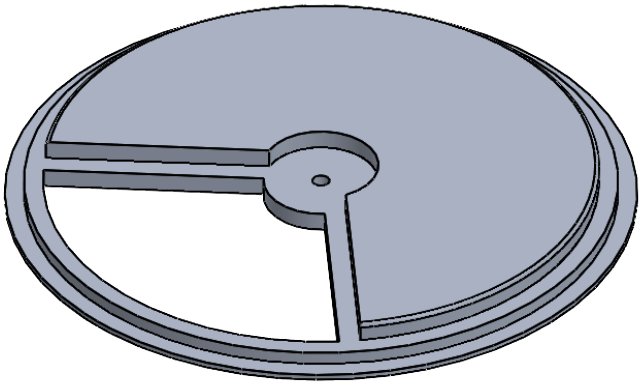
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 7.47 lbs	.X: ±0.1
VOLUME: 76.58 in^3	.XX: ±0.05
MATERIAL: 1060 Alloy	.XXX: ±0.001

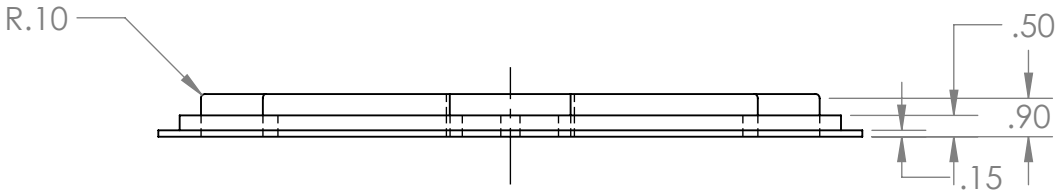
EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
Seperator top



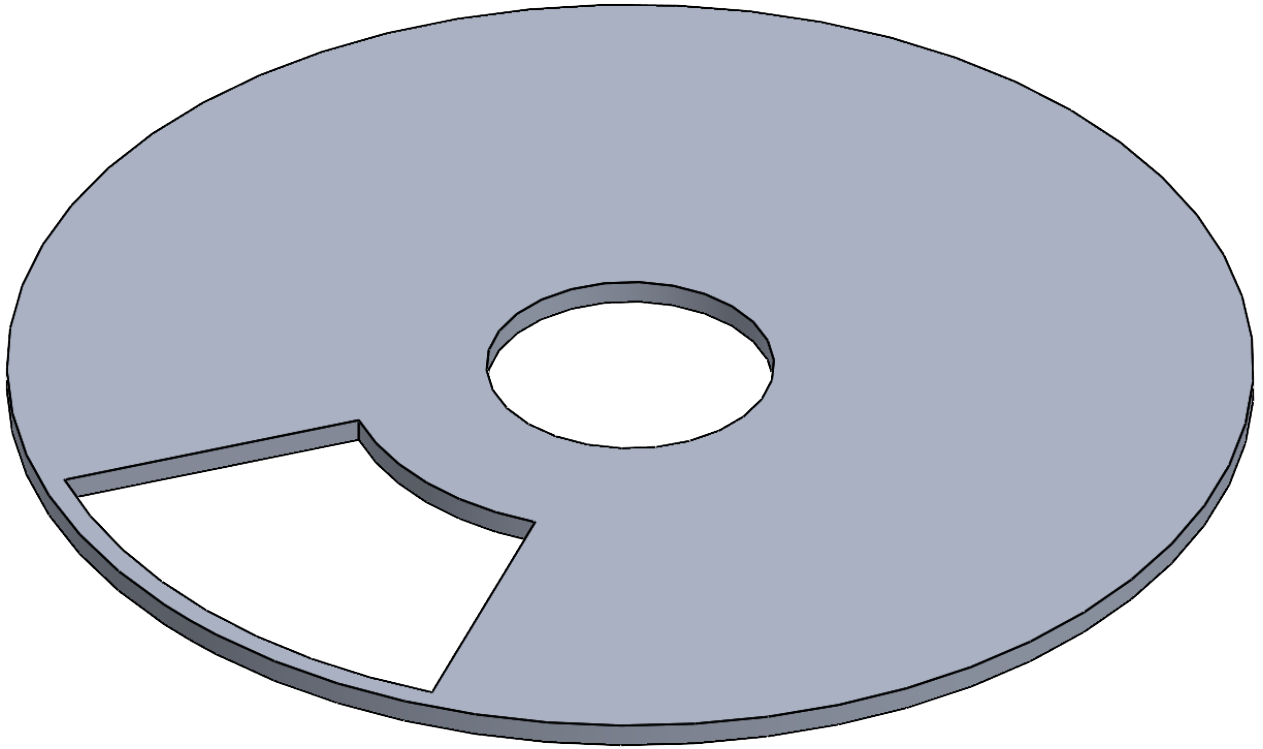




KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 7.47 lbs	.X: ±0.1
VOLUME: 76.58 in^3	.XX: ±0.05
MATERIAL: 1060 Alloy	.XXX: ±0.001

EiD: atonovitz
SECTION: TU 2:30 DATE: 4/21/2024
PART NAME:
Seperator top



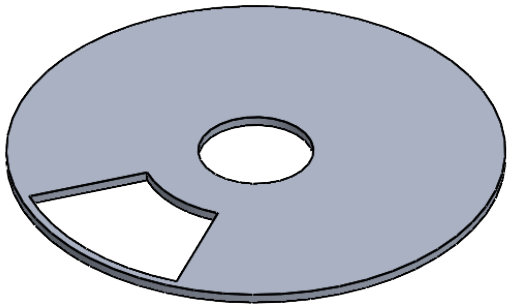
KANSAS STATE UNIVERSITY
College of Engineering

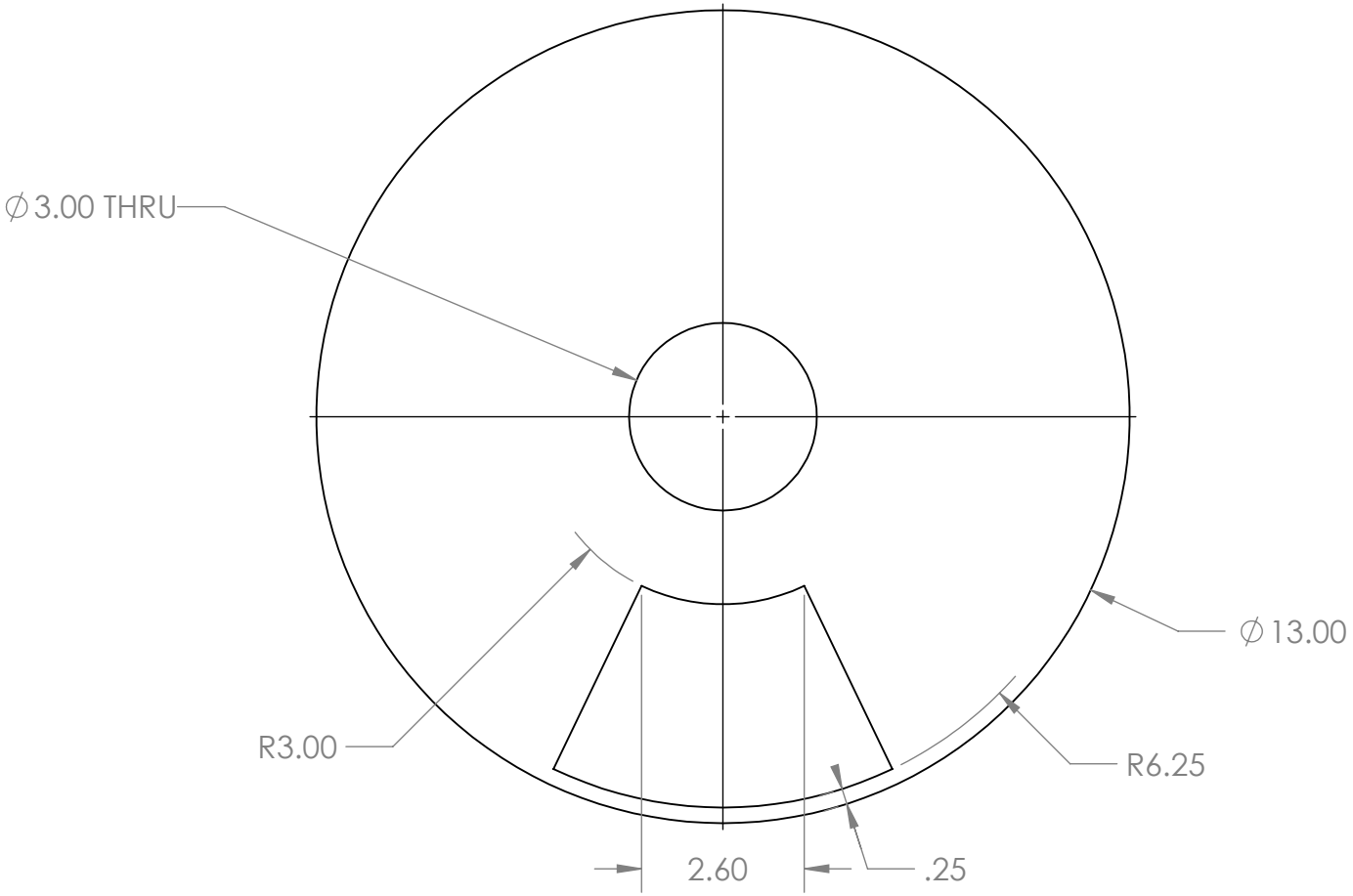
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 2.74 lbs	.X: ±0.1
VOLUME: 28.05 in^3	.XX: ±0.05
MATERIAL: 1060 Alloy	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
seperator





NOTE: THICKNESS IS .25 INCHES

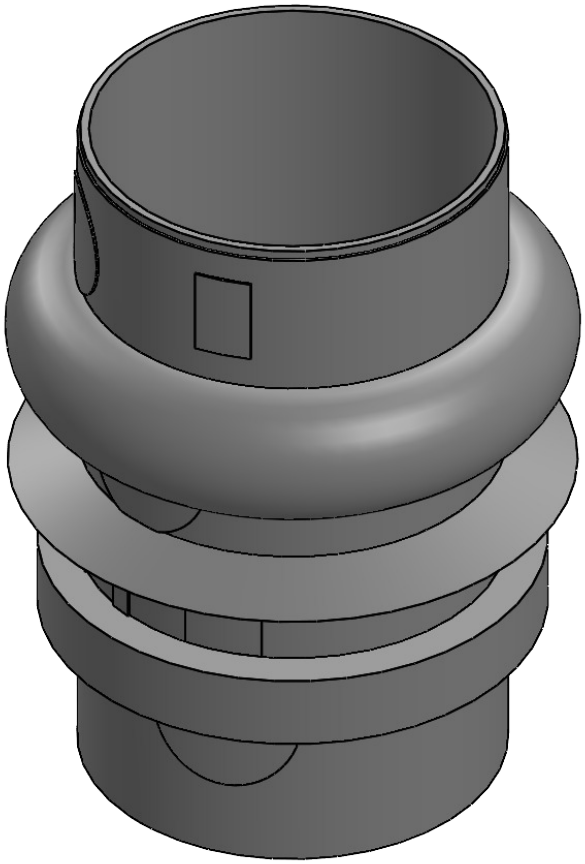
KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 2.74 lbs	.X: ±0.1
VOLUME: 28.05 in^3	.XX: ±0.05
MATERIAL: 1060 Alloy	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
seperator



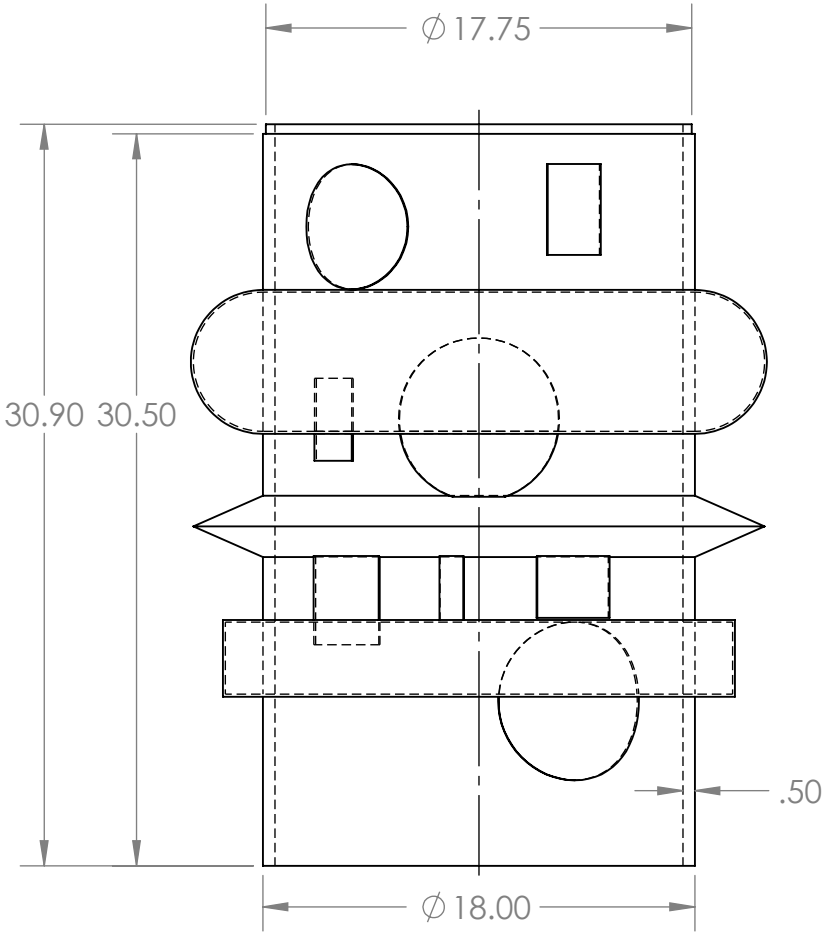
KANSAS STATE UNIVERSITY
College of Engineering

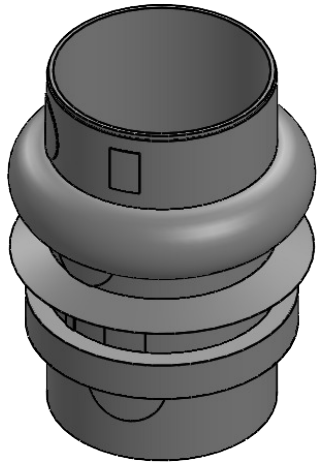
DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 44.05 lbs	.X: ±0.1
VOLUME: 1195.42 in^3	.XX: ±0.05
MATERIAL: Custom Plastic	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
shaft





KANSAS STATE UNIVERSITY
College of Engineering

DESIGNER: AUSTIN TONOVITZ	DEFAULT TOLERANCES: (IN)
MASS: 44.05 lbs	.X: ±0.1
VOLUME: 1195.42 in^3	.XX: ±0.05
MATERIAL: Custom Plastic	.XXX: ±0.001

EiD: atonovitz

SECTION: TU 2:30 | DATE: 4/21/2024

PART NAME:
shaft