

Iron Man Arm

Stark Industries

By:

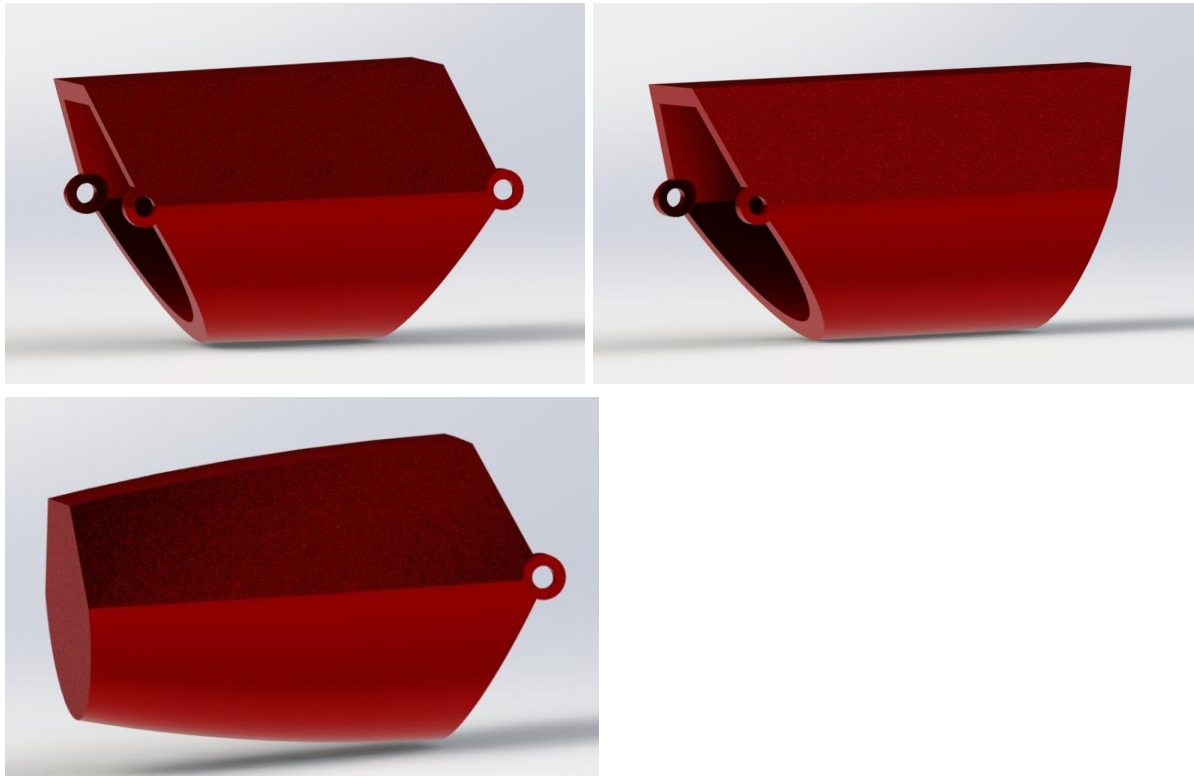
Kenneth Liu & William Zhou

Introduction

Our project is to create a Mark 3 Iron Man arm. The color way is a sleek red and a bright gold for the Iron Man Assembly; Black and gray for the War Machine Configuration. Our part is made from gold titanium alloy.

Parts

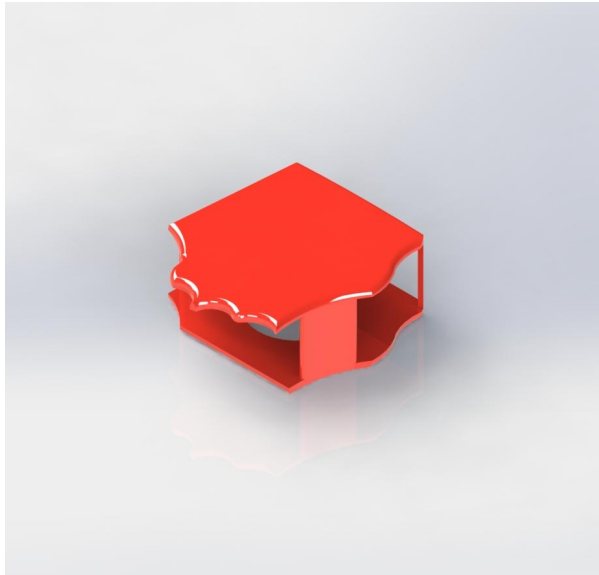
The parts consist of fingers, hand, blaster, forearm, and rocket holder.



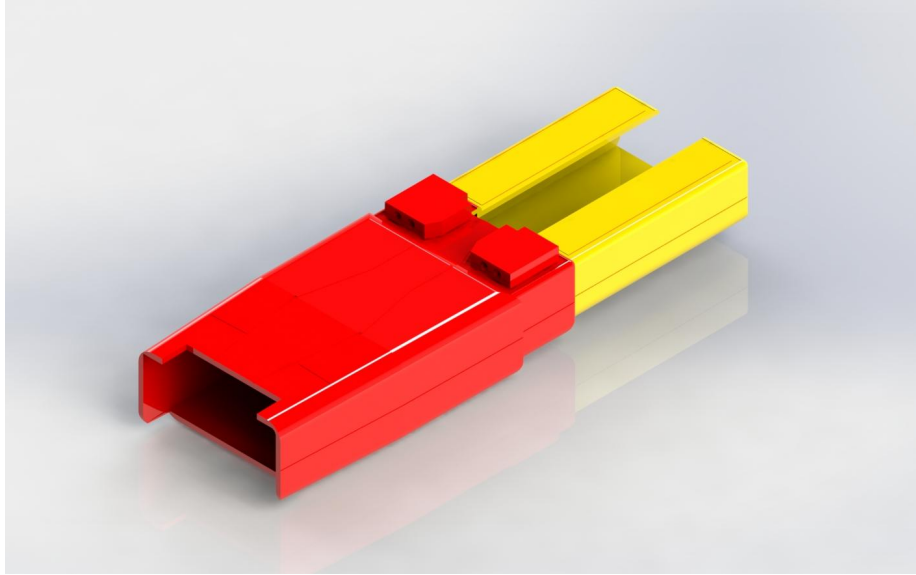
This part was made by sketching three equivalent lines and a semicircle. For the bottom segment, it was extruded to a certain length. For the middle segment, it was extruded to a certain length with a draft of 1 degree. For the tip, a smaller version was created at a given distance and was lofted using 2 guide lines. Each segment was cut to allow for relief when moving. A hinge was added to connect the fingers together.



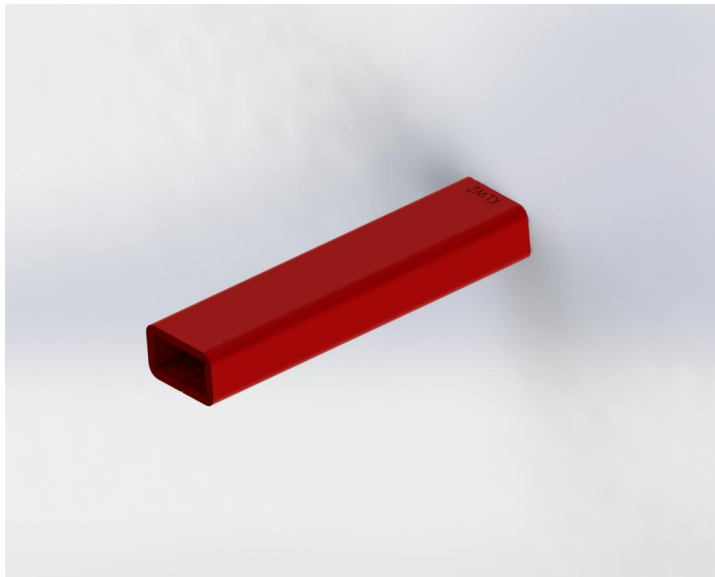
This part was made by sketching two circles and extruding.



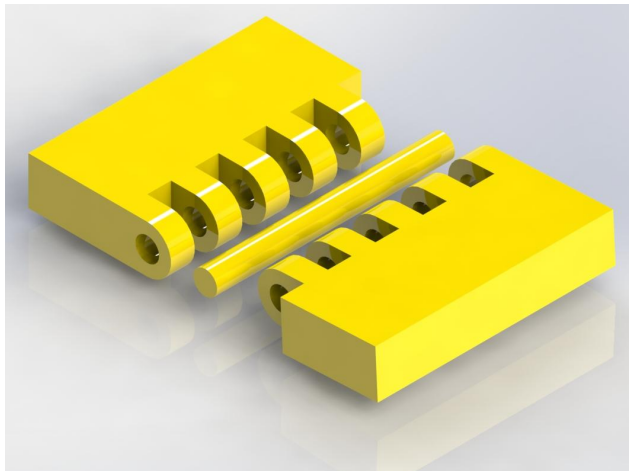
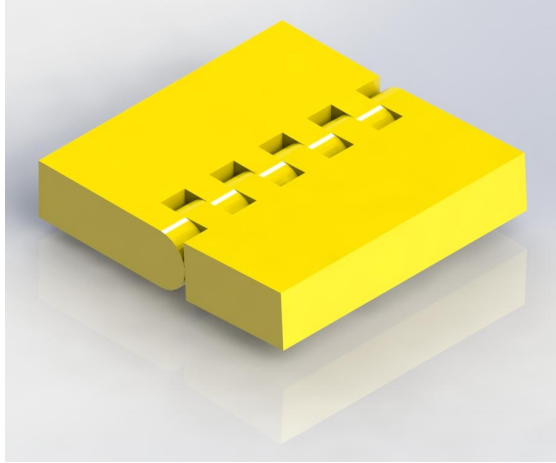
This part was made by using online values for the average sized hand for a male, as well as self-measurements. The curves were splined to trace an image of a glove and the entire part was shelled with a thickness of .1 inches. The top of the glove has an arc with radius 25 to add more texture to the glove and at the bottom of the glove has indents to show grooves for design purposes.



This part was made by a loft between 4 rectangular shapes. Then it was cut through at front of the part to provide wiggle room for wrist movement. The cut at the big end is only cut through the top surface. This is where the rocket holder would be situated.



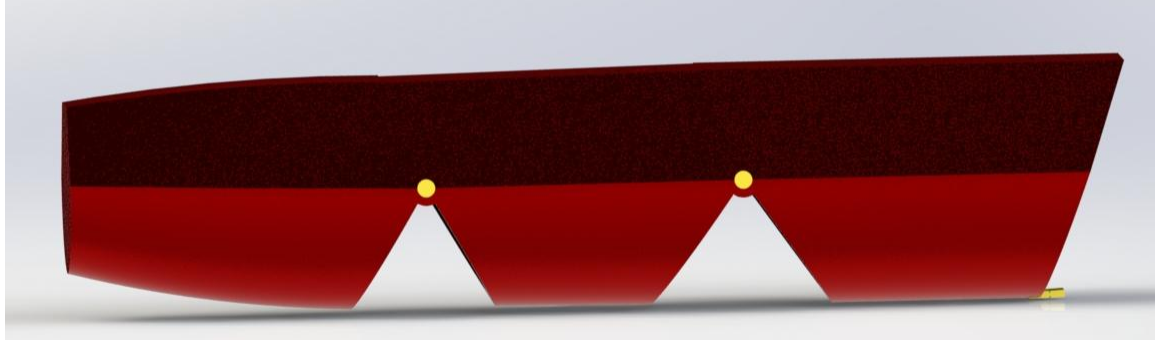
This part was made with the sheet metal feature. It is a simple 4 bend sheet metal to fit in between the cut on the forearm part.



The hinges were made to connect the glove to the forearm parts, as well as the fingers to the glove.

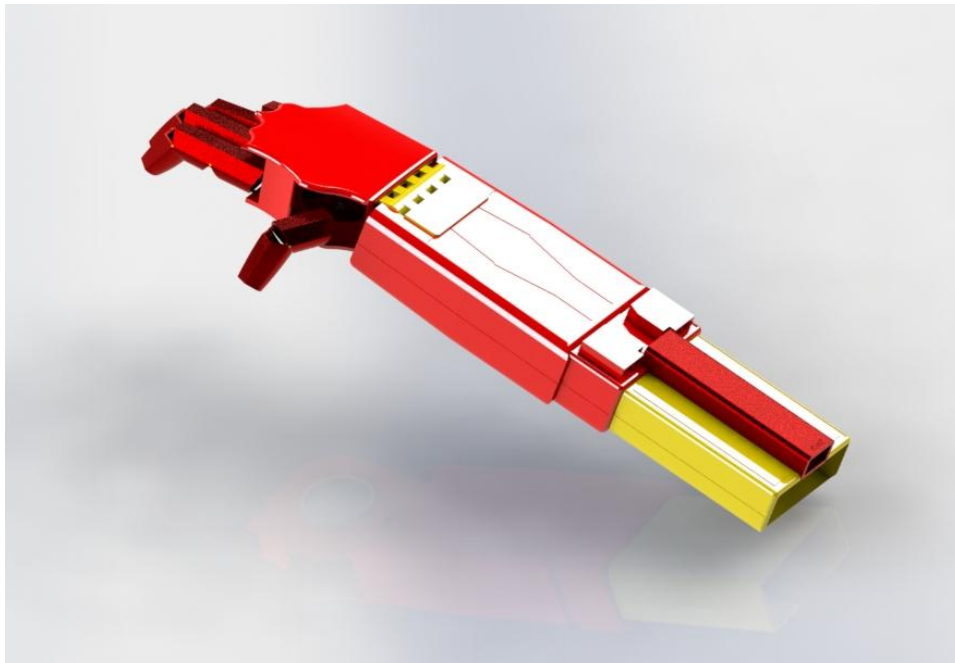


The pinion was made to connect the fingers together through another hinge on the fingers.



Each finger sub-assembly consisted of each finger segment, 4 pins and a hinge.

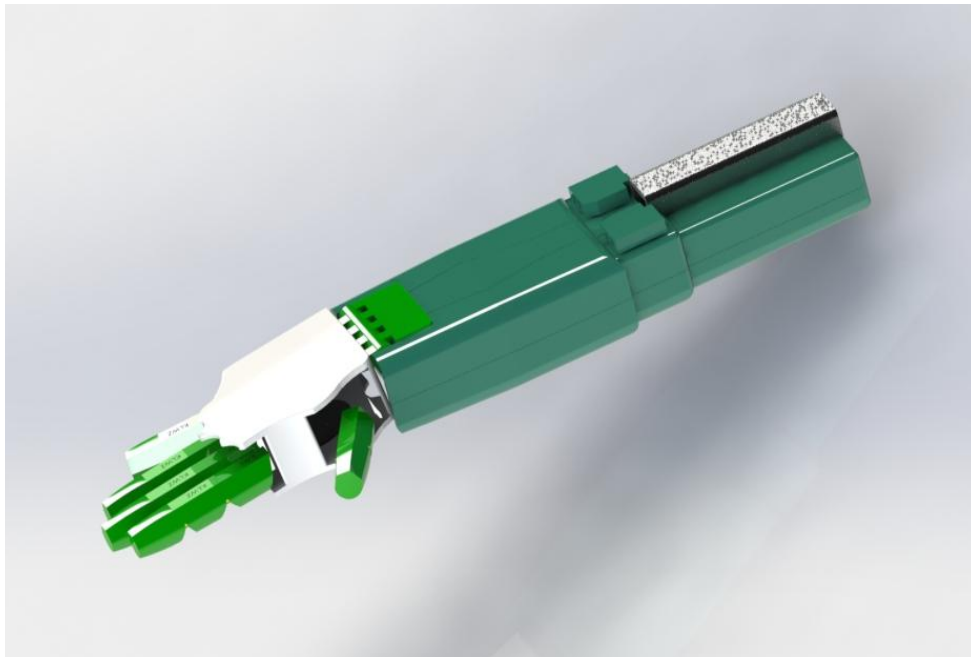
Iron Man Assembly



War Machine Configuration

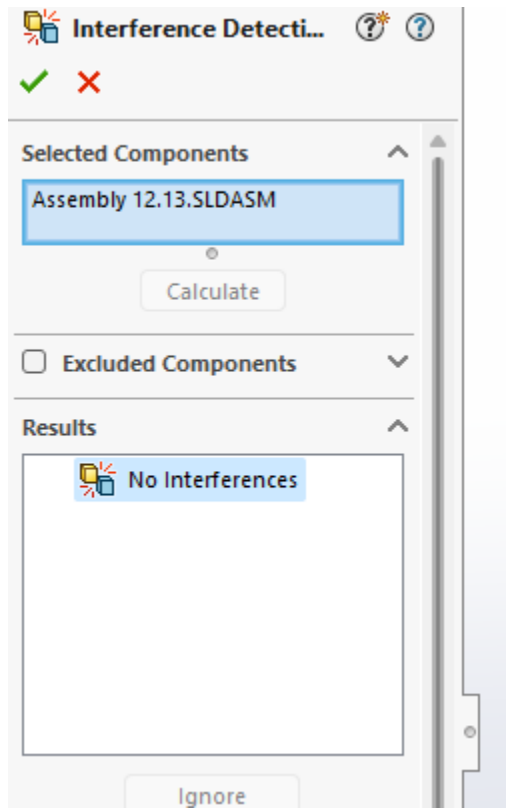


Jets Configuration

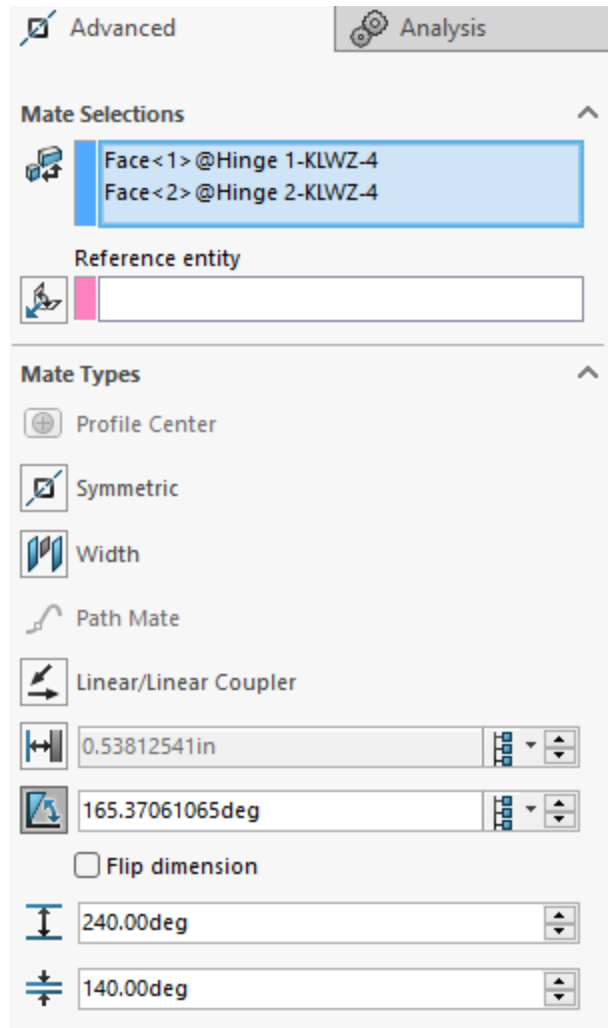


As asked in an email before, we added the configuration renders since eDrawings was not working properly for us.

Interference Check:

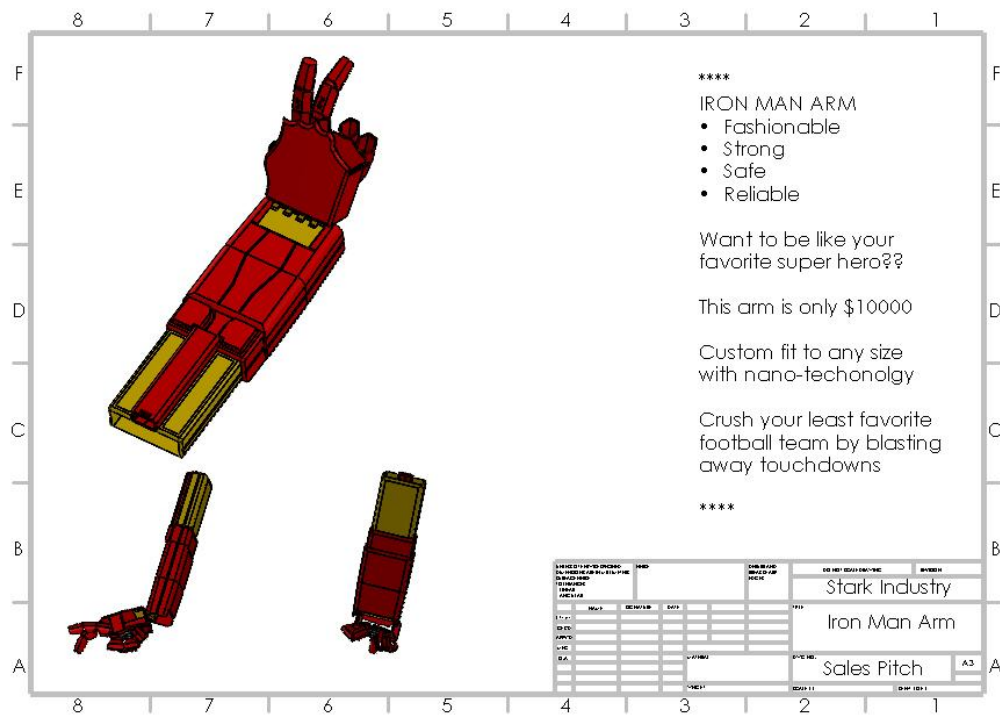


It is shown that there were no interferences in the part assembly.



The hinges and fingers were both limited in angle using the LimitAngle mate to depict a more realistic movement restriction.

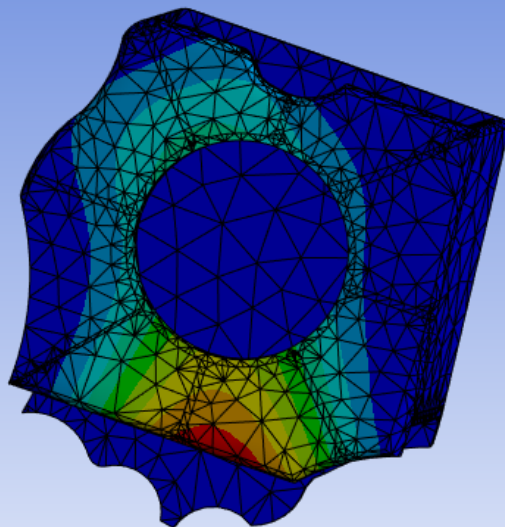
Sales Drawing

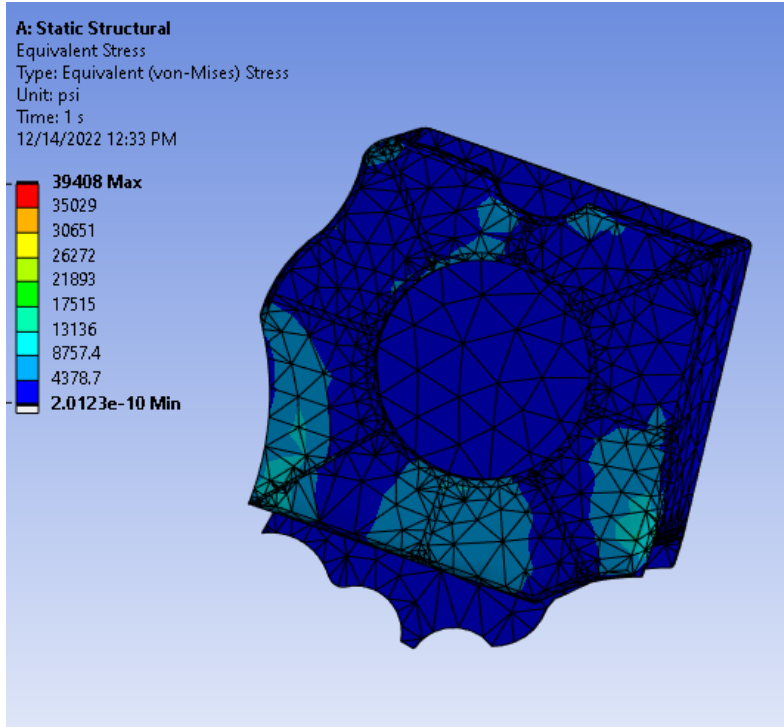


Stress Analysis

A: Static Structural
 Total Deformation
 Type: Total Deformation
 Unit: in
 Time: 1 s
 12/14/2022 12:32 PM

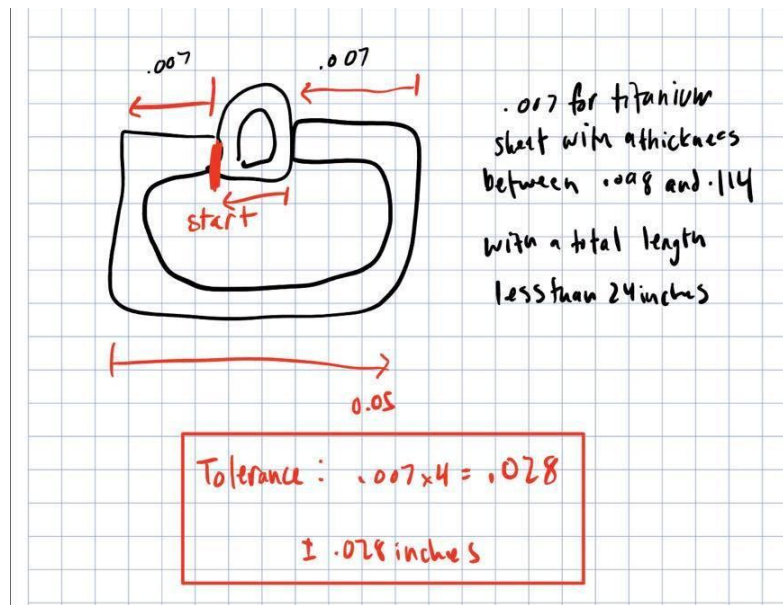
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 0.0049411
 0.004236
 0.0036308
 0.0030257
 0.0024205
 0.0018154
 0.0012103
 0.00060514
 0 Min



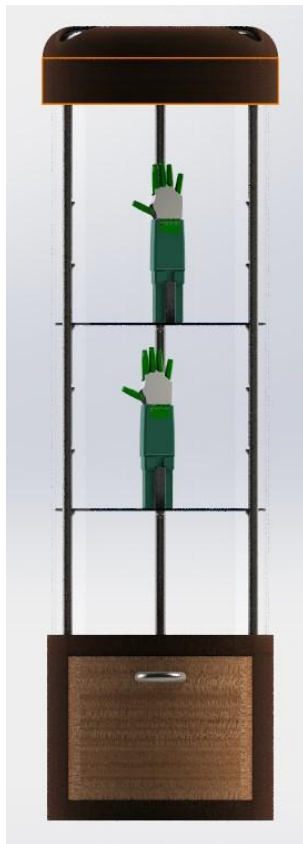


For the stress analysis, we added a force load of the average car onto the palm of the hand to see if it could withstand the pressure. It is seen that the deformation is very tiny and the stress is around 4000 psi on the palm.

Tolerance Analysis Results



Super Team Collaboration



Our Jets configuration Iron Man Arm is to be showcased inside the Met Stadium.

Work Load

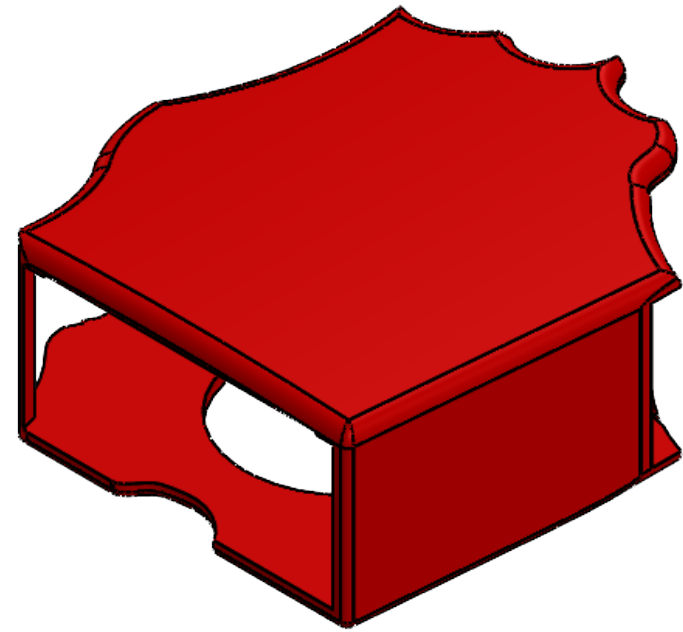
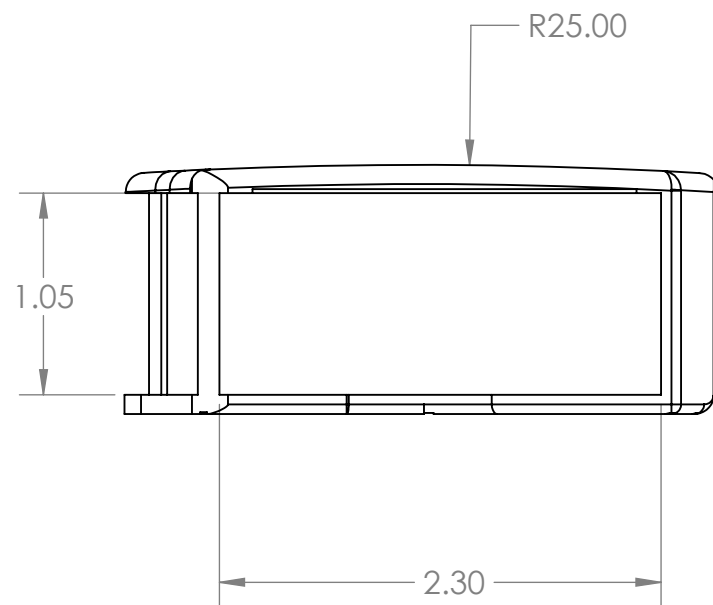
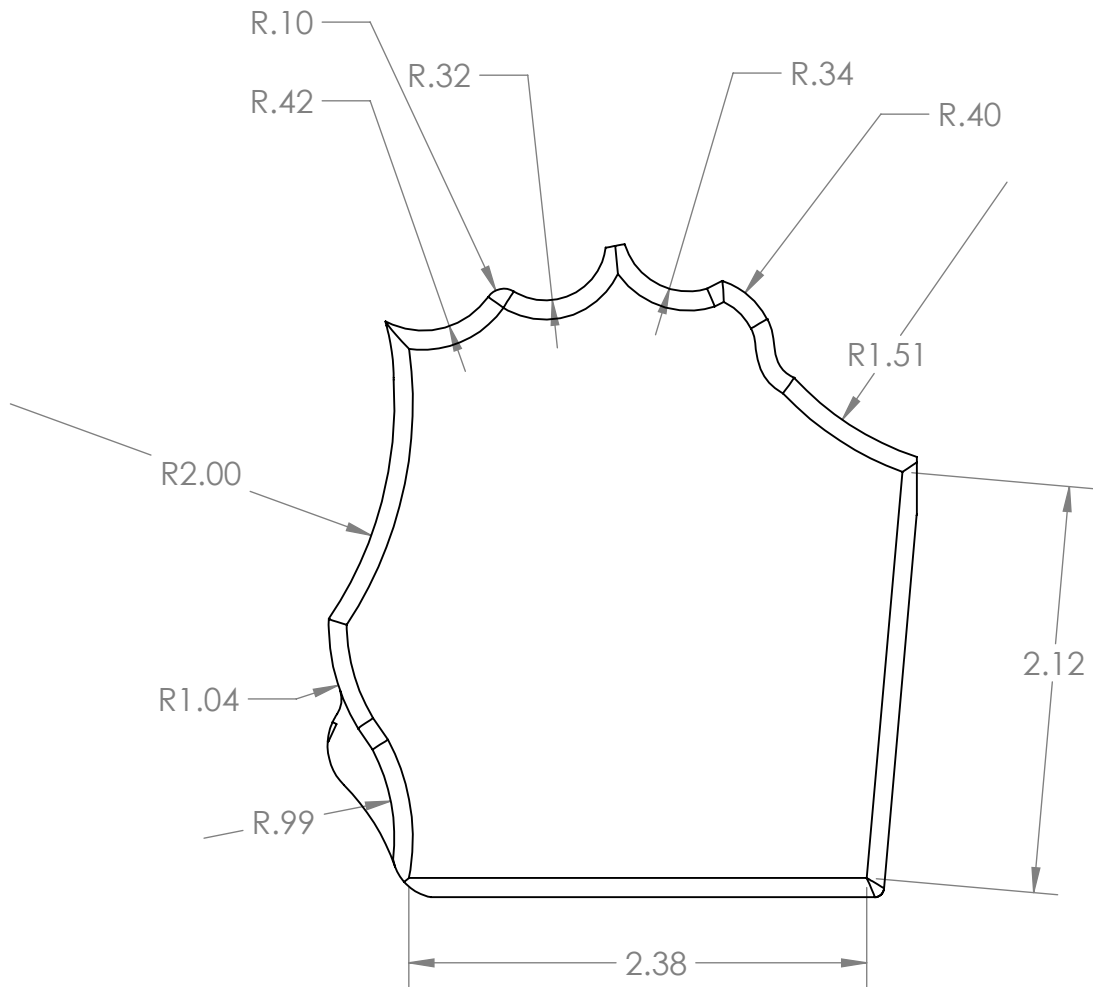
William:

- Fingers
- Hinges
- Bolts
- Drawing
- Assembly
- Presentation

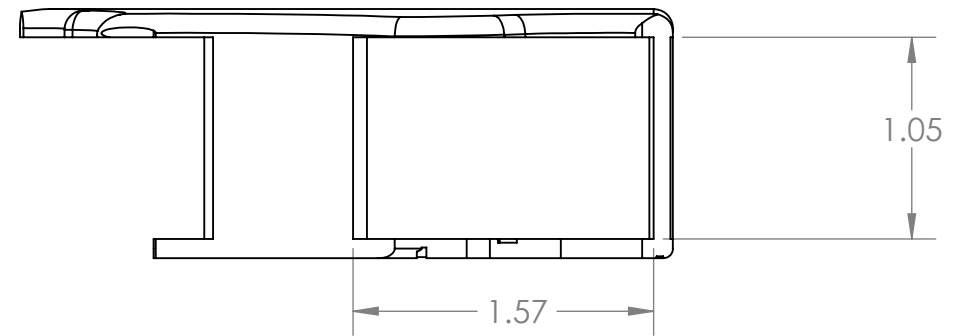
Kenneth:

- Glove
- Forearm
- Blaster
- Sheet metal
- Hinges
- Drawings
- Assembly
- Presentation

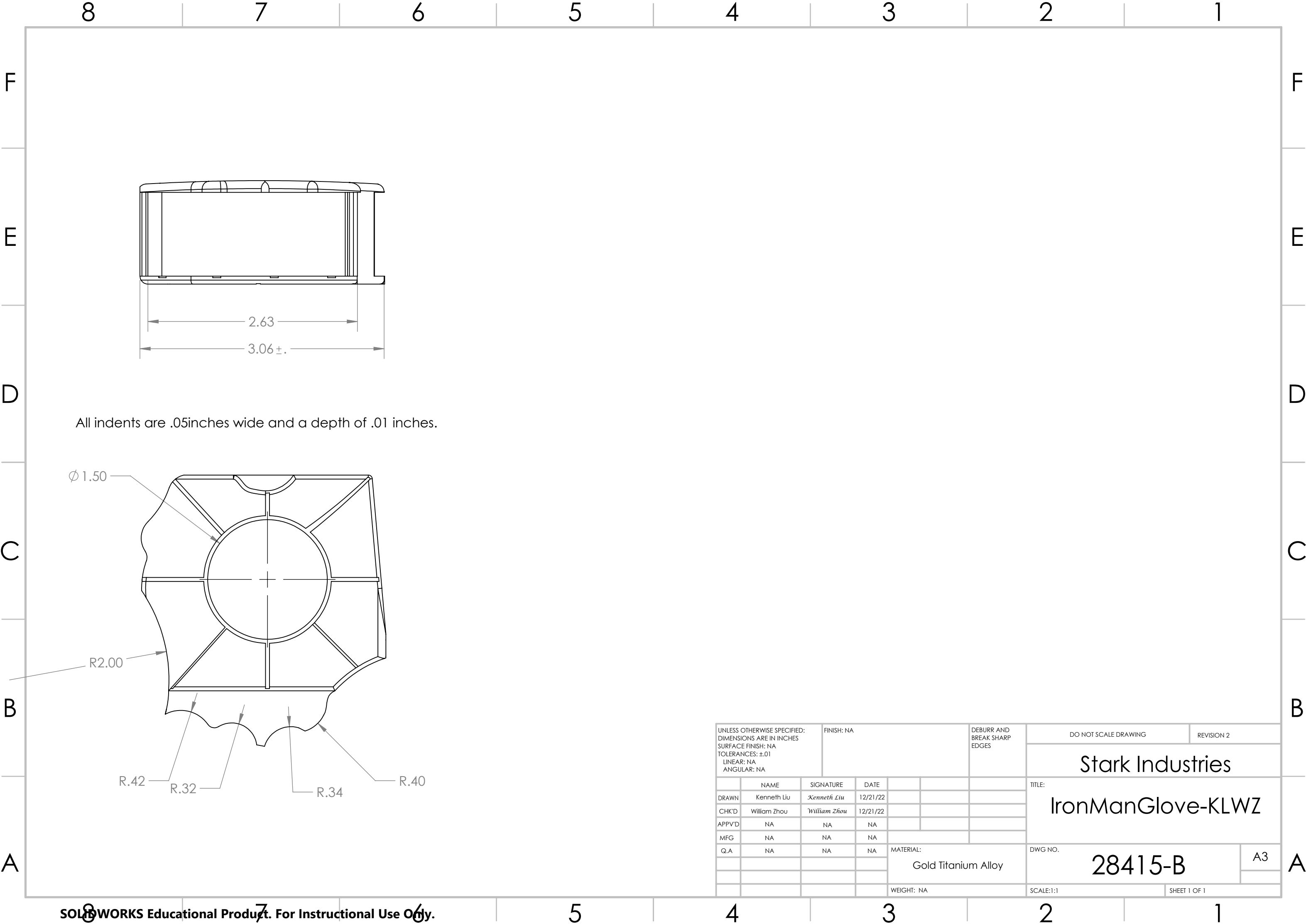
Drawings:

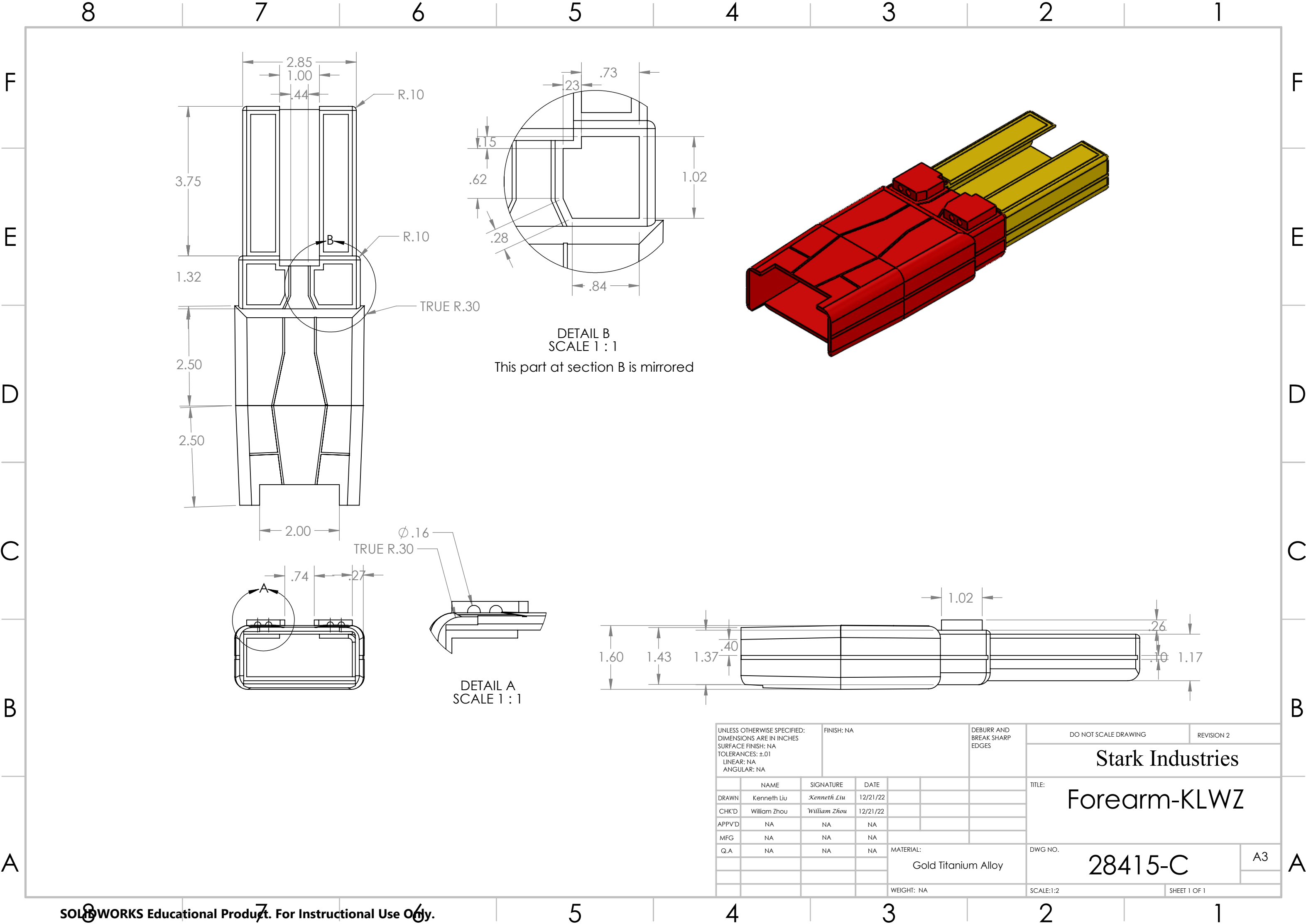


Part was shelled with thickness of .1
All fillets were .1 Inches



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES SURFACE FINISH: NA TOLERANCES: ±.01 LINEAR: NA ANGULAR: NA				FINISH: NA		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		REVISION 2	
								Stark Industries			
	NAME	SIGNATURE	DATE			TITLE: IronManGlove-KLWZ					
DRAWN	Kenneth Liu	<i>Kenneth Liu</i>	12/21/22								
CHK'D	William Zhou	<i>William Zhou</i>	12/21/22								
APP'VD	NA	NA	NA								
MFG	NA	NA	NA			DWG NO. 28415-A					
Q.A	NA	NA	NA	MATERIAL:							
				Gold Titanium Alloy							
				WEIGHT: NA		SCALE:1:1				SHEET 1 OF 1	

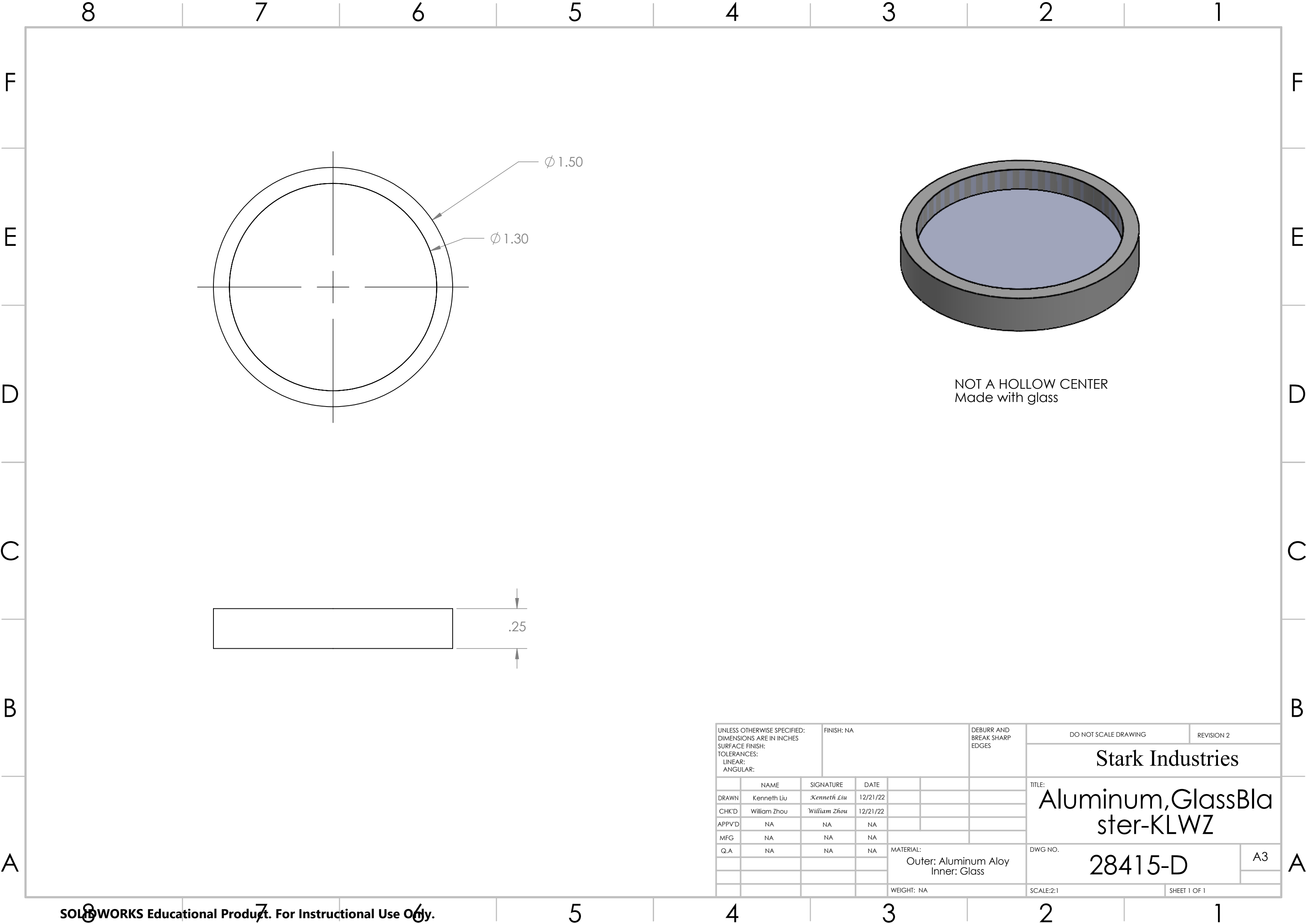


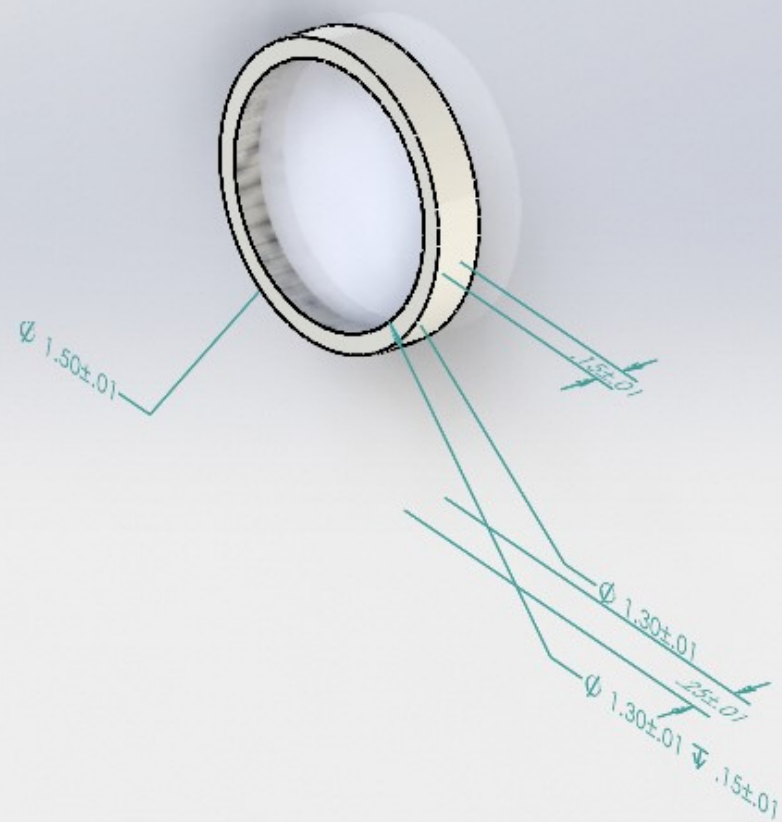


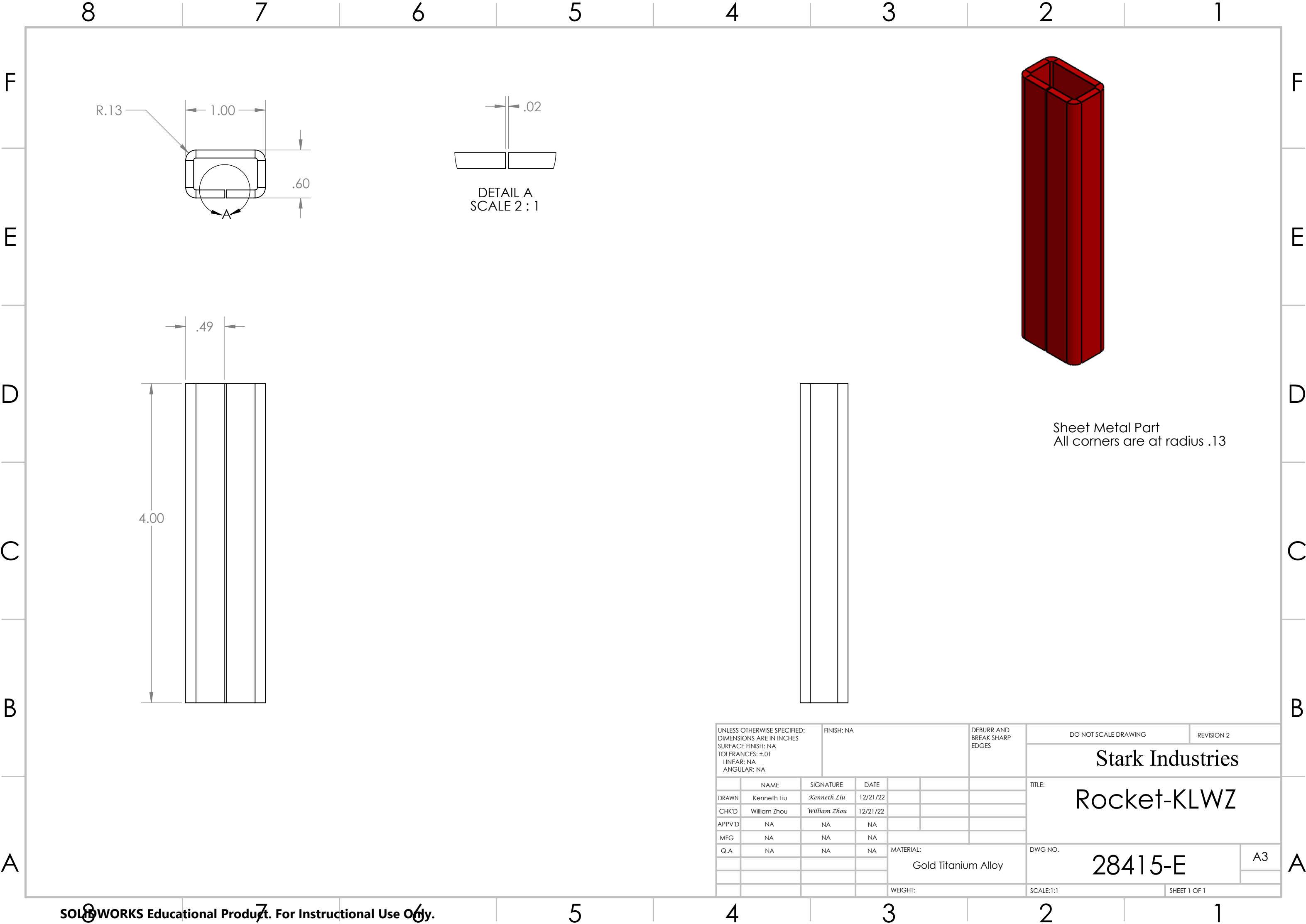
DETAIL B
SCALE 1 : 1
This part at section B is mirrored

DETAIL A
SCALE 1 : 1

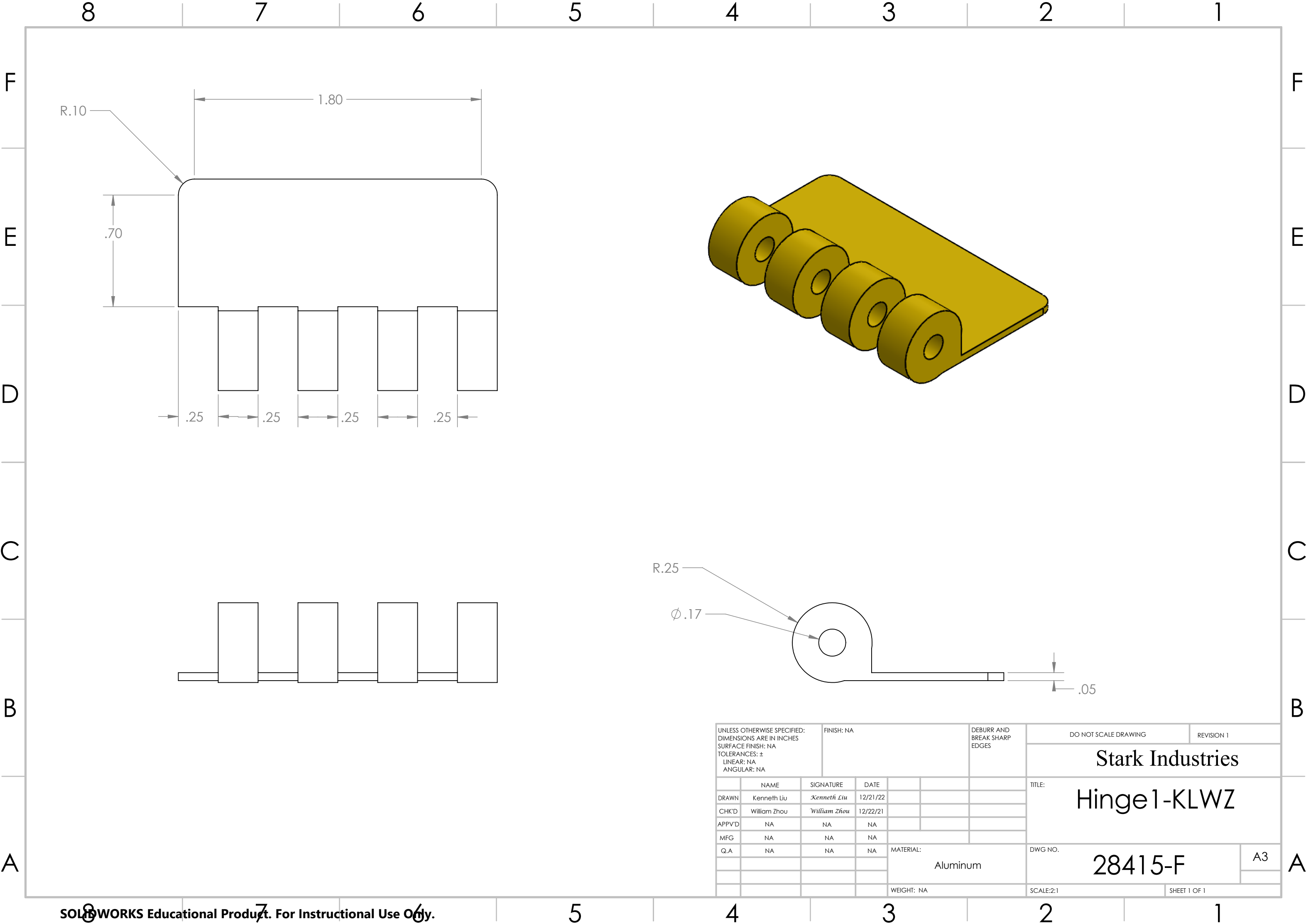
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							Stark Industries					
	NAME		SIGNATURE		DATE				TITLE: Forearm-KLWZ			
DRAWN	Kenneth Liu		Kenneth Liu		12/21/22							
CHK'D	William Zhou		William Zhou		12/21/22							
APPV'D	NA		NA		NA							
MFG	NA		NA		NA							
Q.A	NA		NA		NA		MATERIAL:		DWG NO. 28415-C			
						Gold Titanium Alloy		A3				
							WEIGHT: NA		SCALE:1:2		SHEET 1 OF 1	



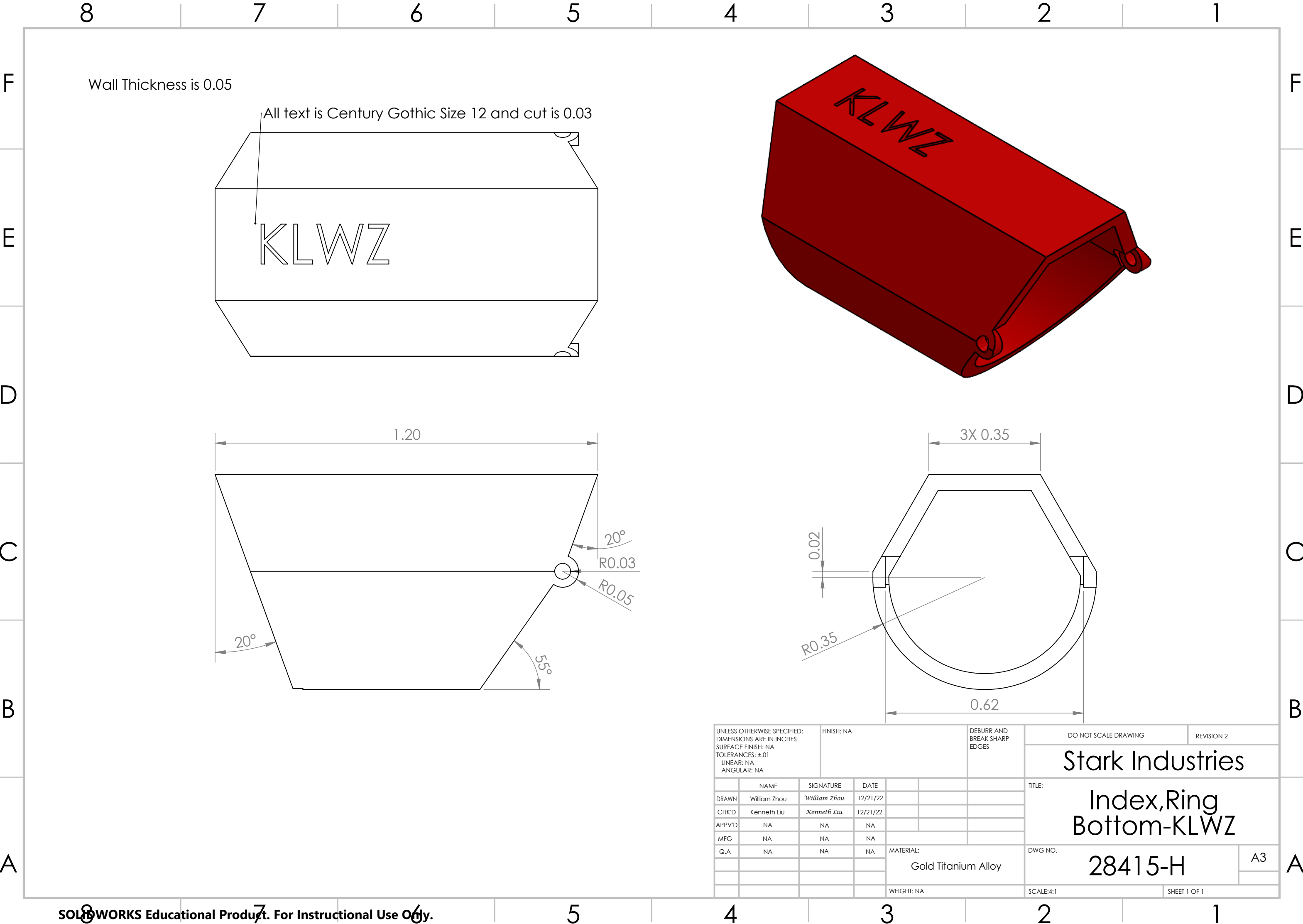


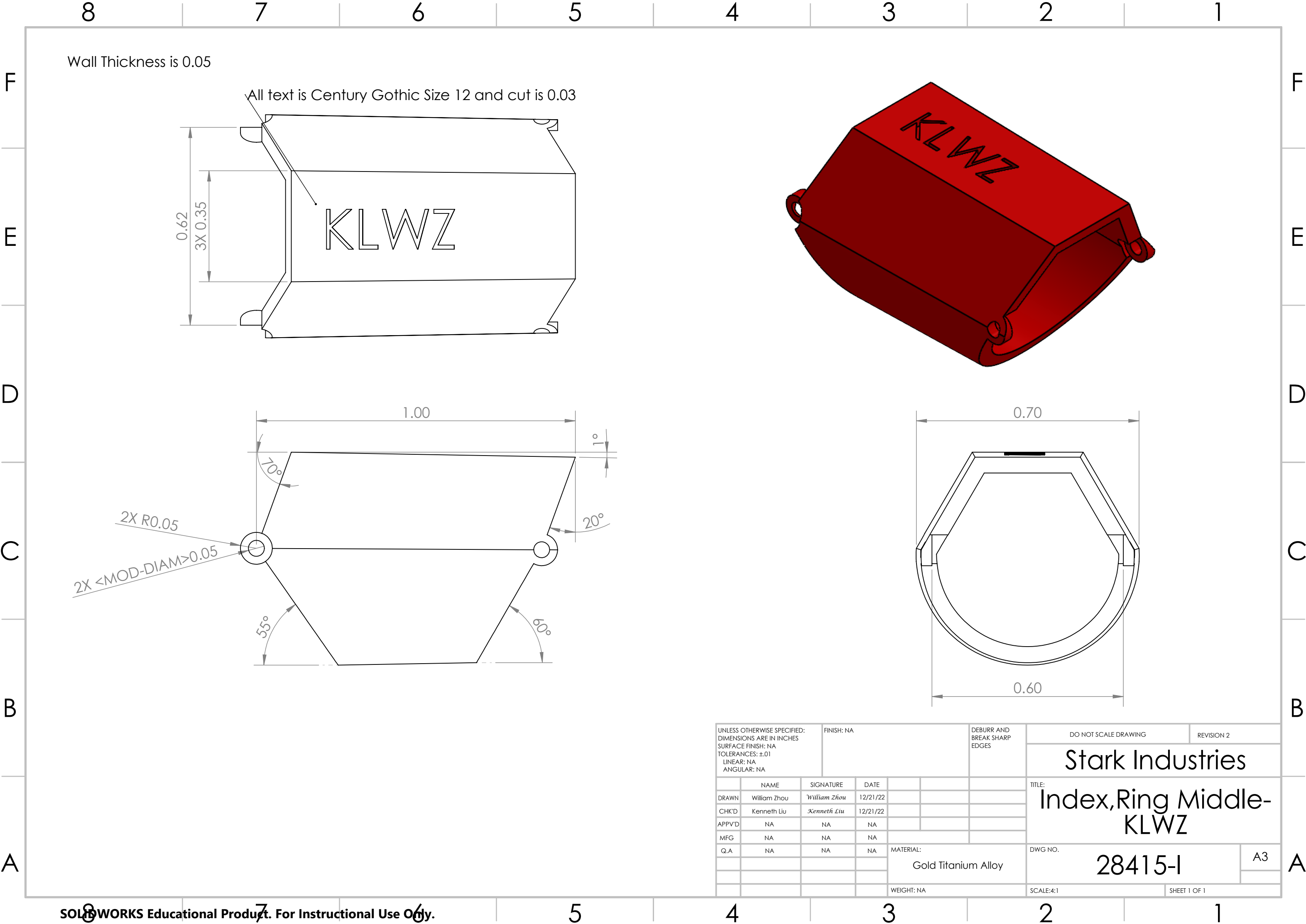


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								Stark Industries			
								Rocket-KLWZ			
								TITLE:			
DRAWN	Kenneth Liu	Kenneth Liu	12/21/22					DWG NO. 28415-E			
CHK'D	William Zhou	William Zhou	12/21/22								
APPV'D	NA	NA	NA								
MFG	NA	NA	NA								
Q.A	NA	NA	NA	MATERIAL:				A3			
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				WEIGHT:				SCALE:1:1		SHEET 1 OF 1	



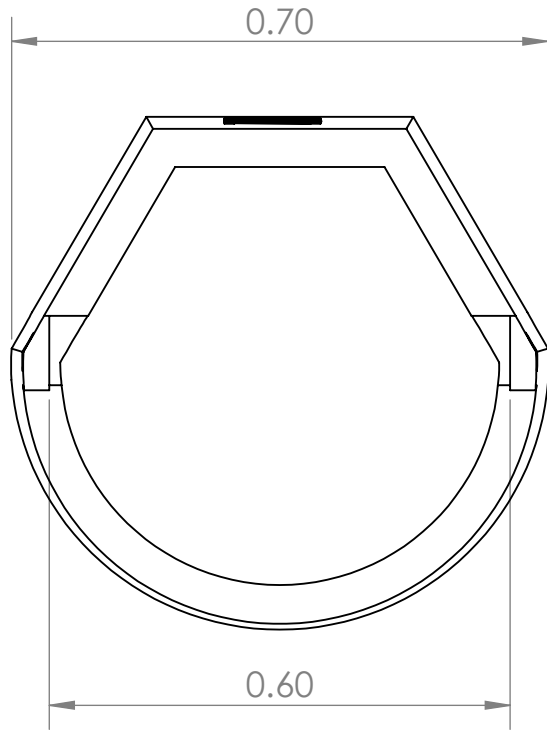
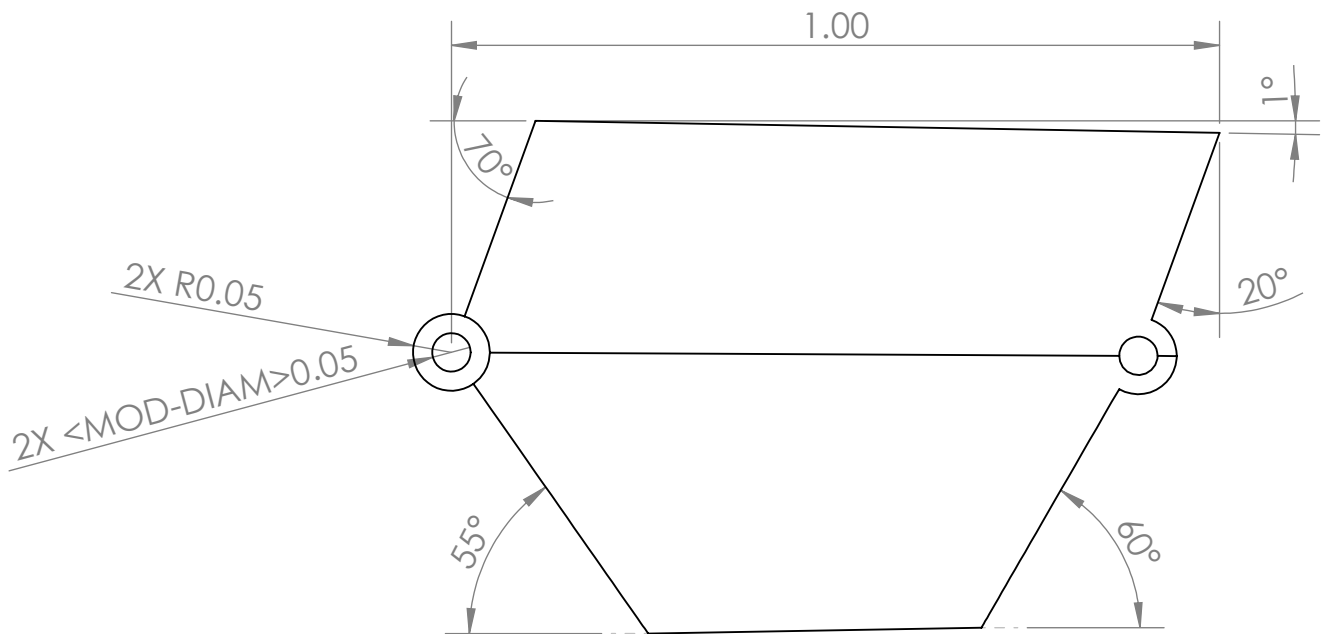
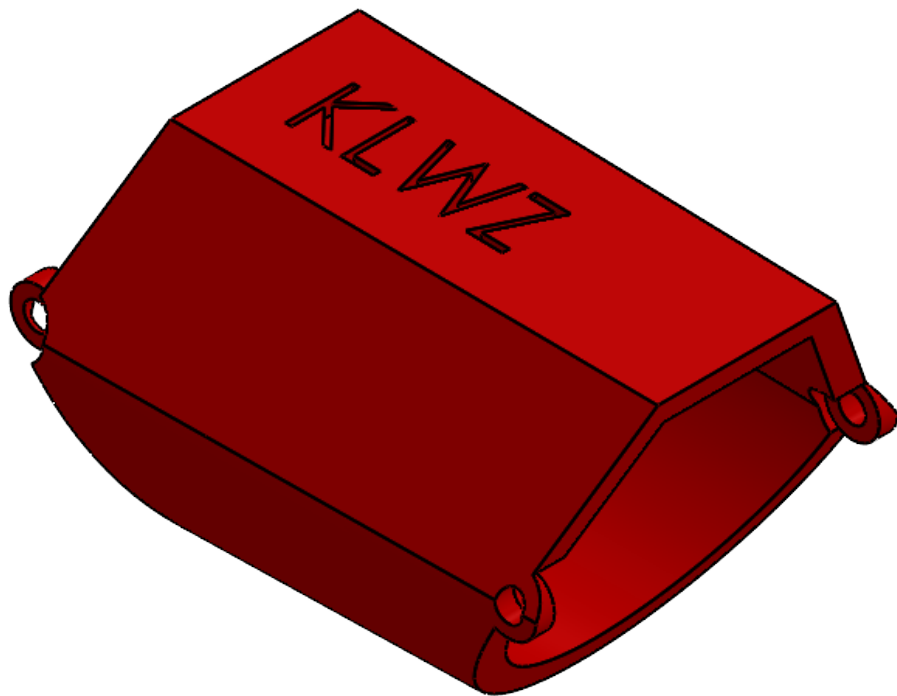
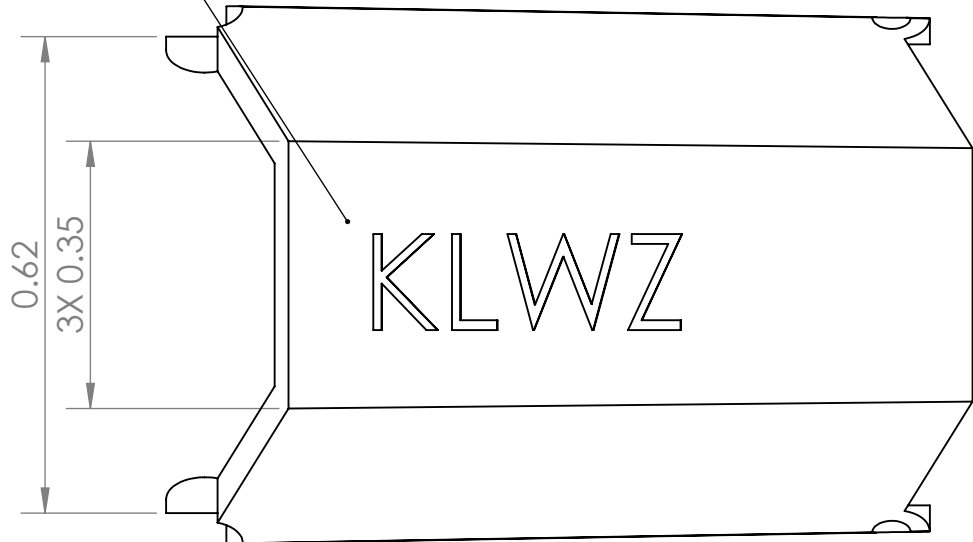
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								Stark Industries			
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DRAWN	Kenneth Liu	Kenneth Liu	12/21/22								
CHK'D	William Zhou	William Zhou	12/22/21								
APPV'D	NA	NA	NA								
MFG	NA	NA	NA								
Q.A	NA	NA	NA	MATERIAL: Aluminum			DWG NO. 28415-F		A3		
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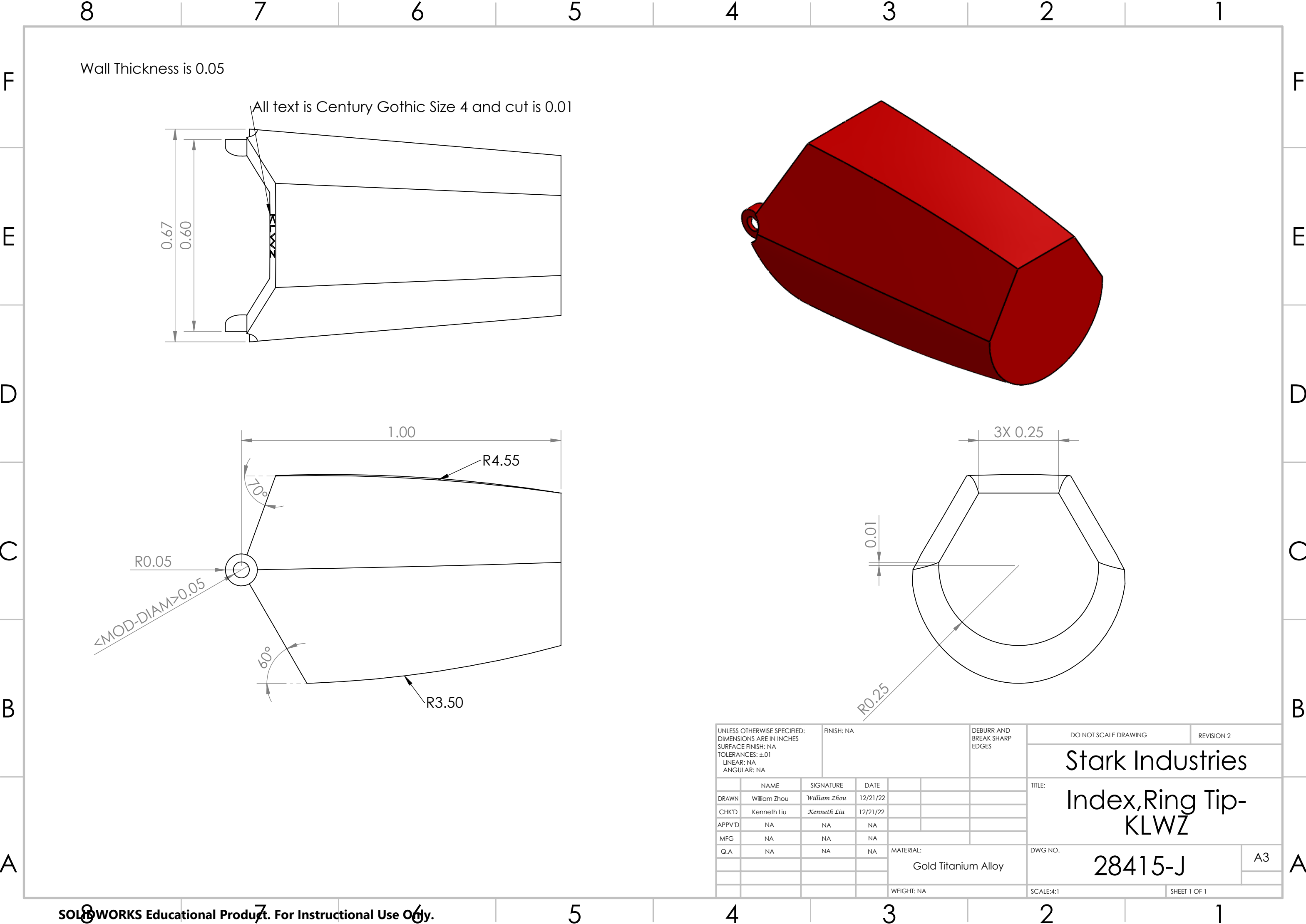


Wall Thickness is 0.05

All text is Century Gothic Size 12 and cut is 0.03

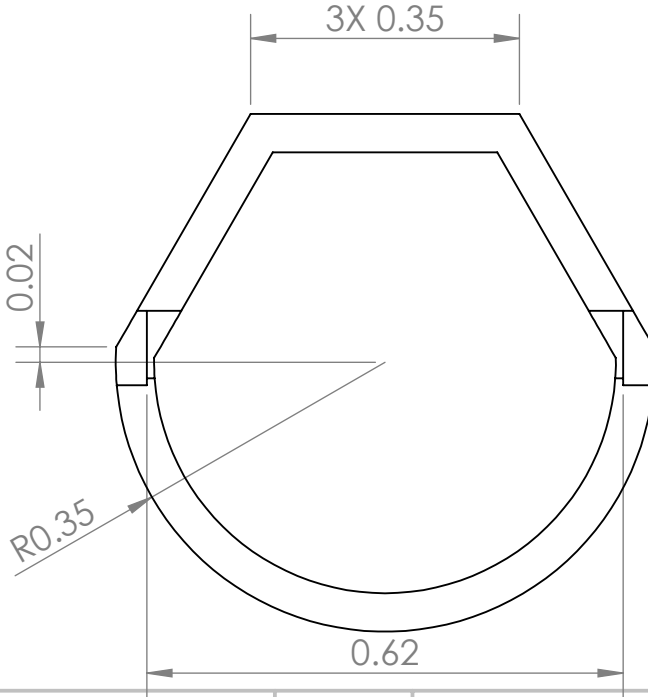
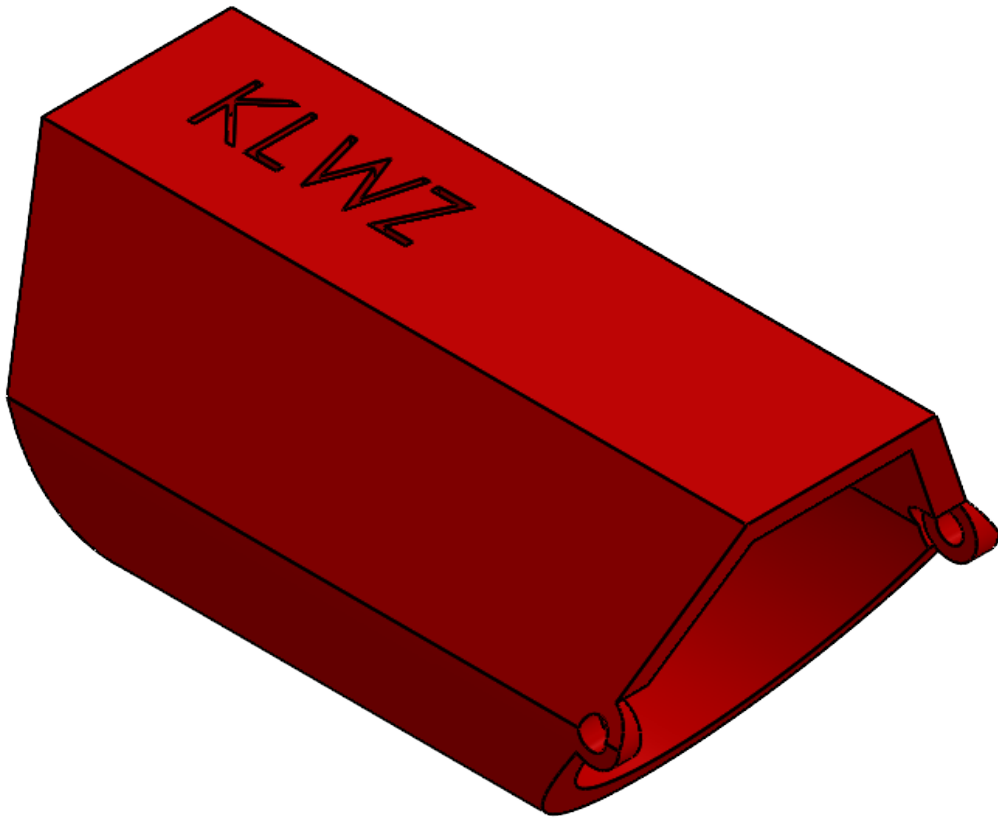
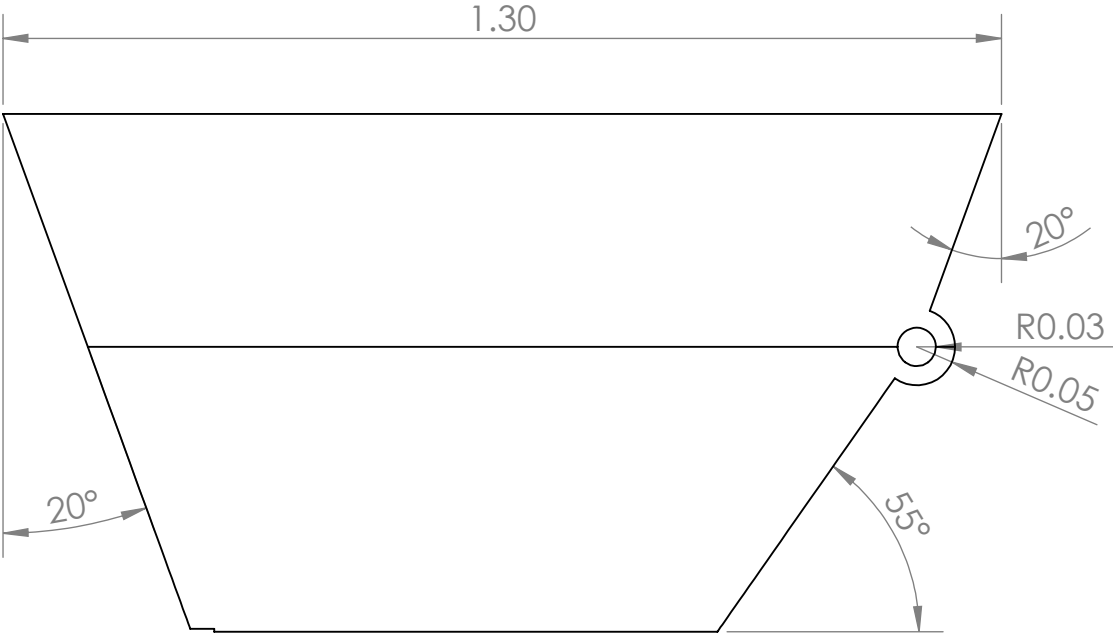
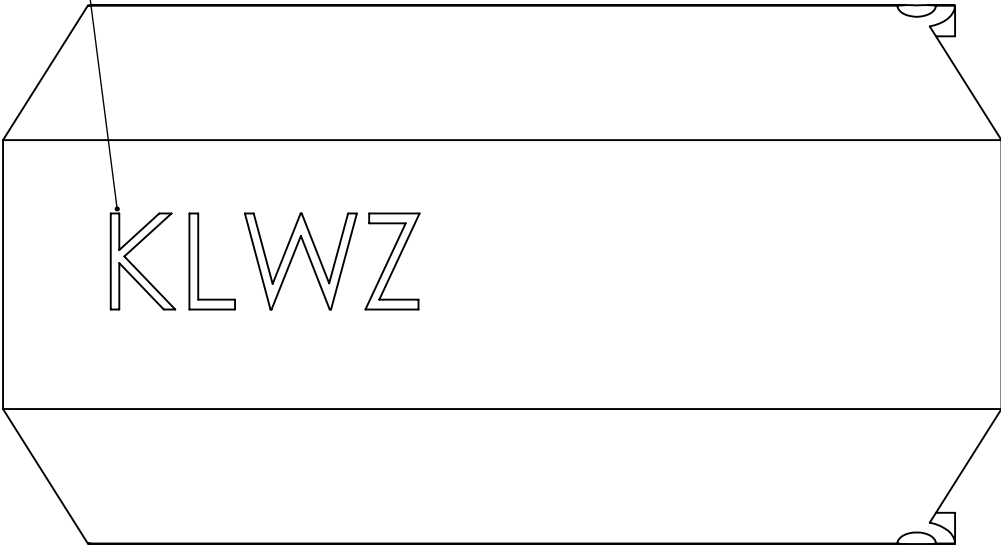


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							A3					

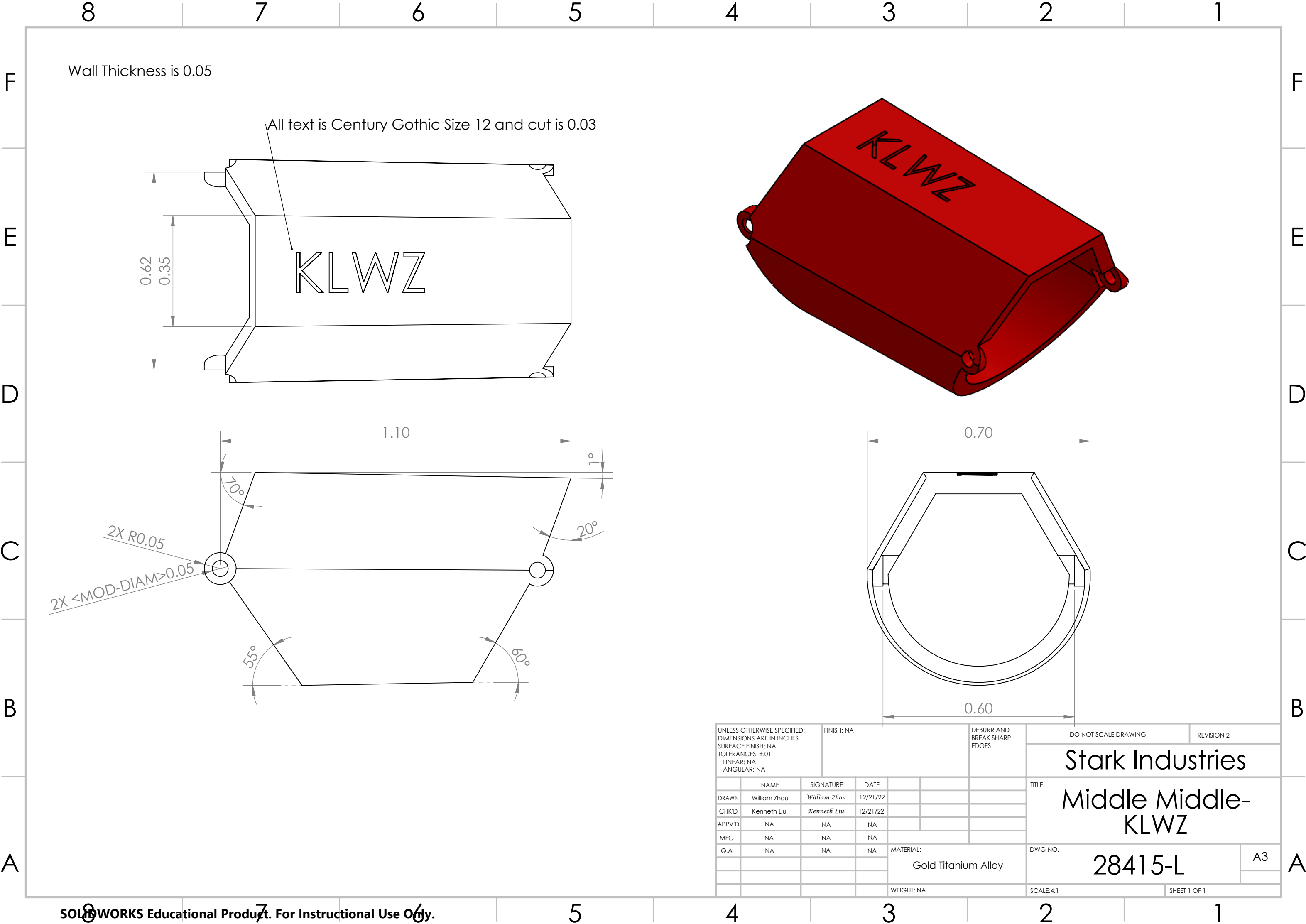


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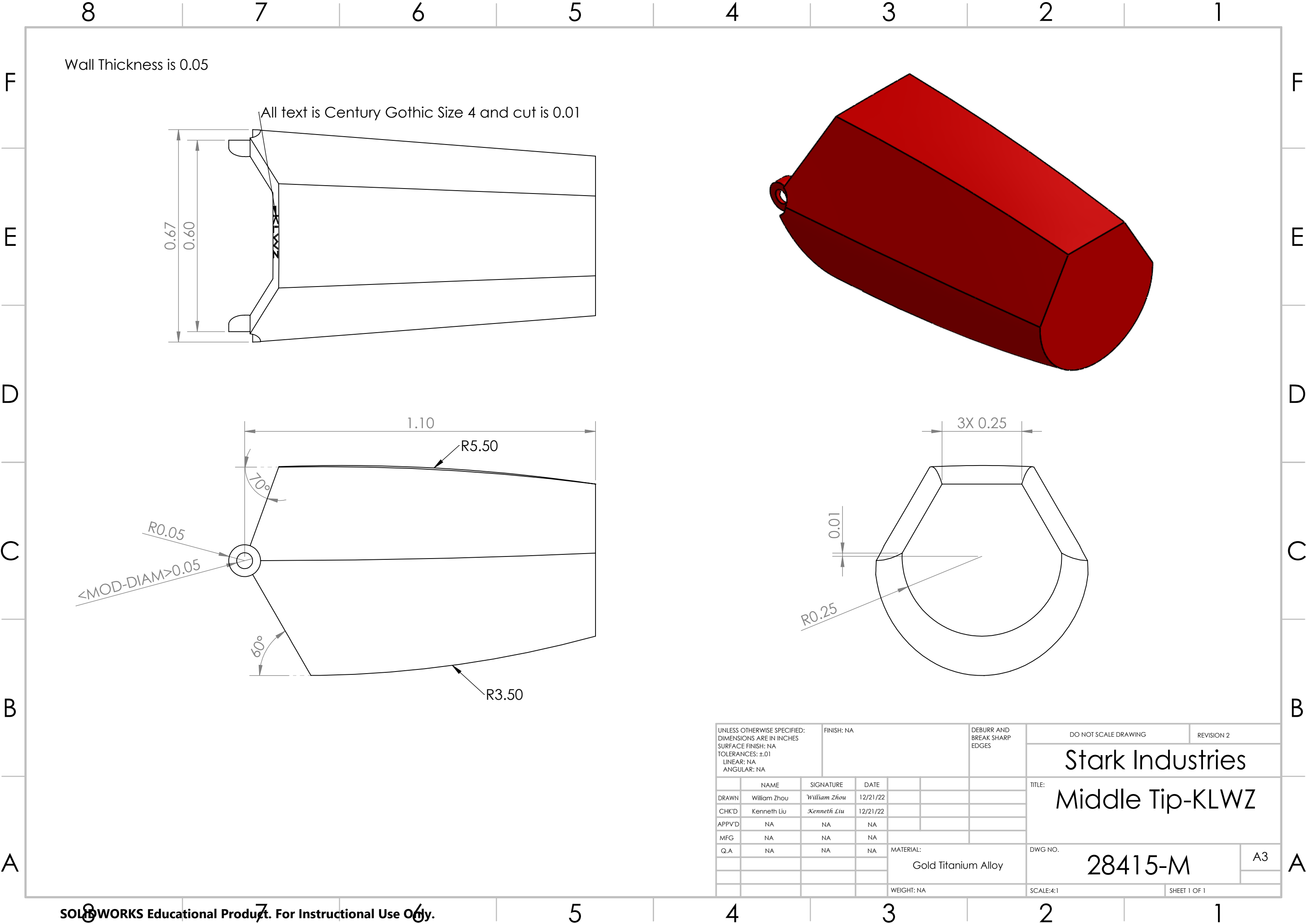
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								Stark Industries			
		NAME	SIGNATURE	DATE				TITLE:	Middle Bottom- KLWZ		
DRAWN	William Zhou	William Zhou	12/21/22								
CHK'D	Kenneth Liu	Kenneth Liu	12/21/22								
APPV'D	NA	NA	NA								
MFG	NA	NA	NA								
Q.A	NA	NA	NA	MATERIAL: Gold Titanium Alloy				DWG NO. 28415-K		A3	
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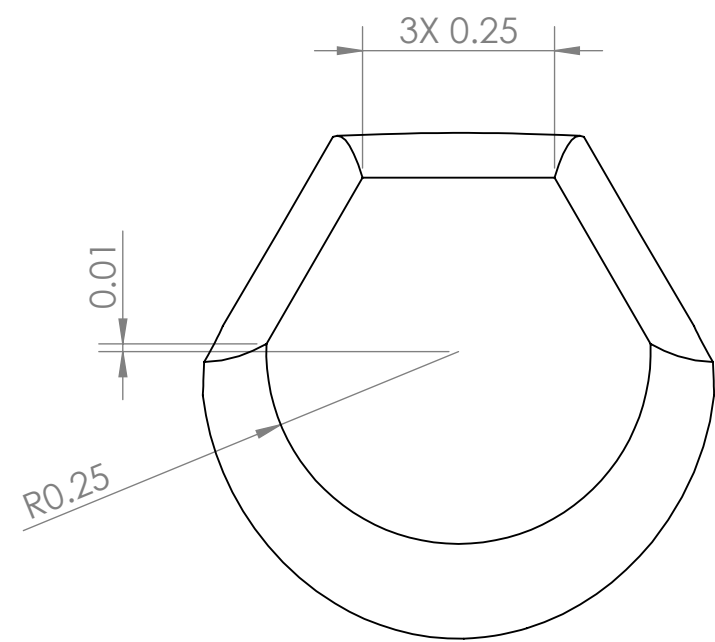
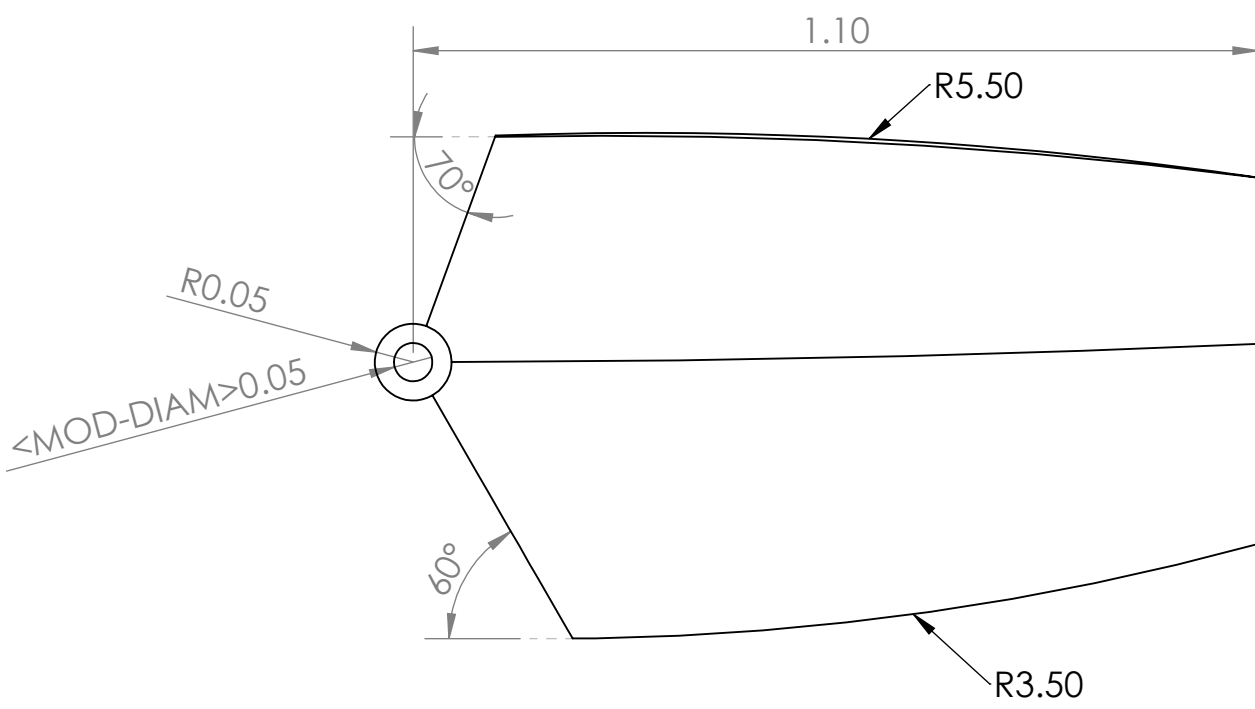
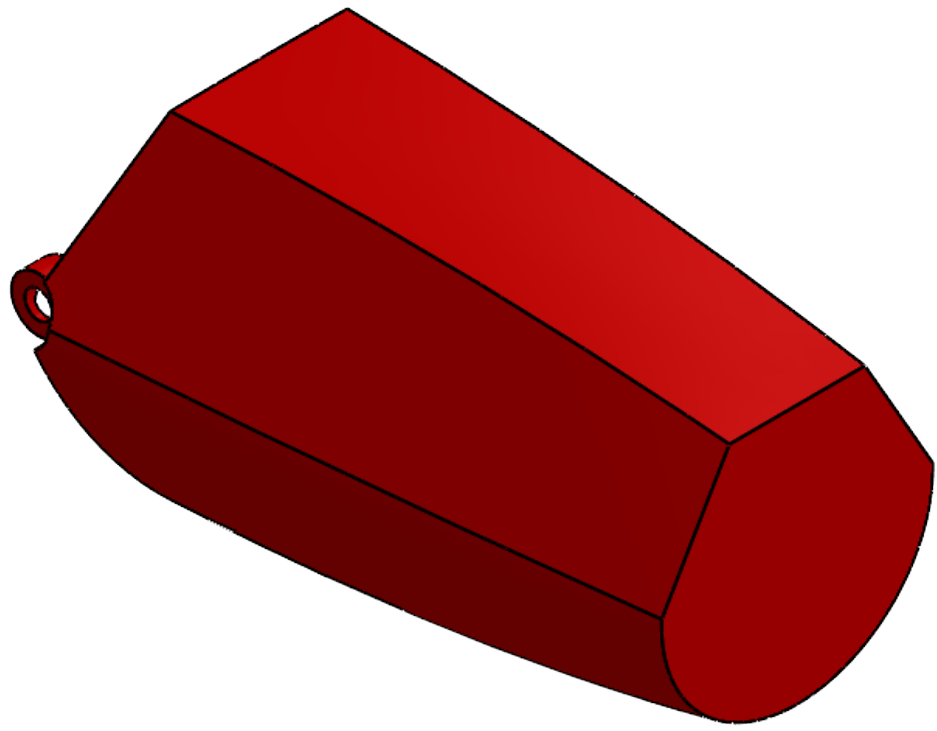
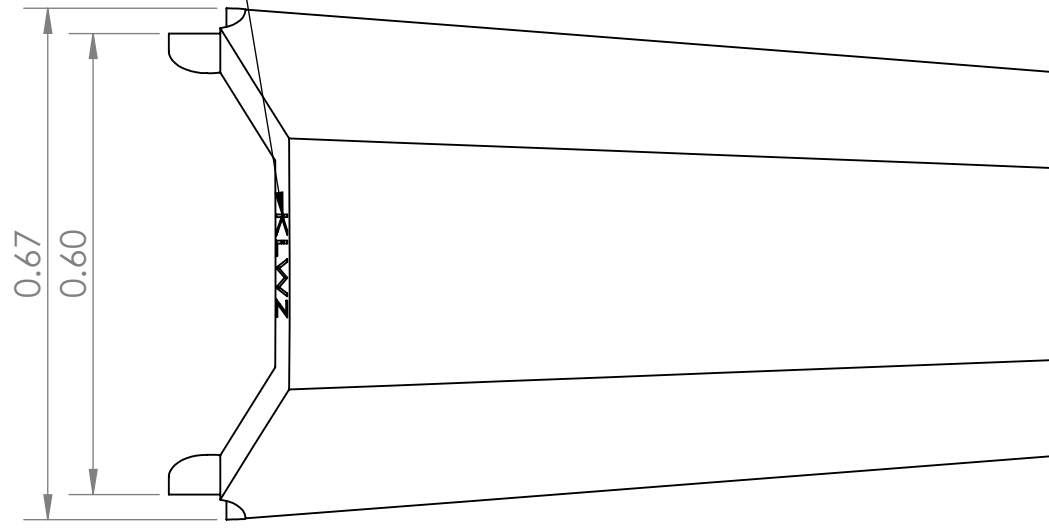


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								Middle Middle- KLWZ					
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Wall Thickness is 0.05

All text is Century Gothic Size 4 and cut is 0.01



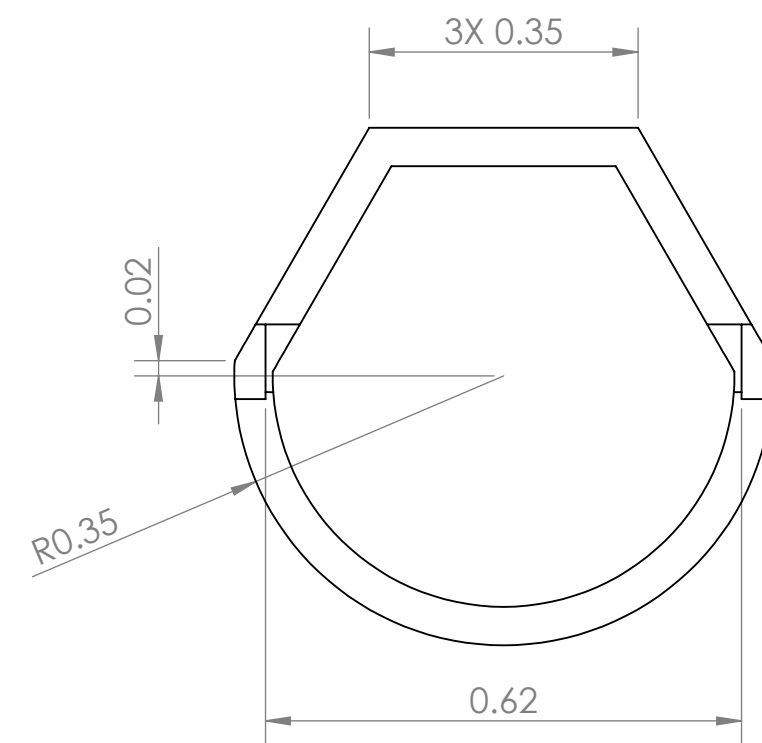
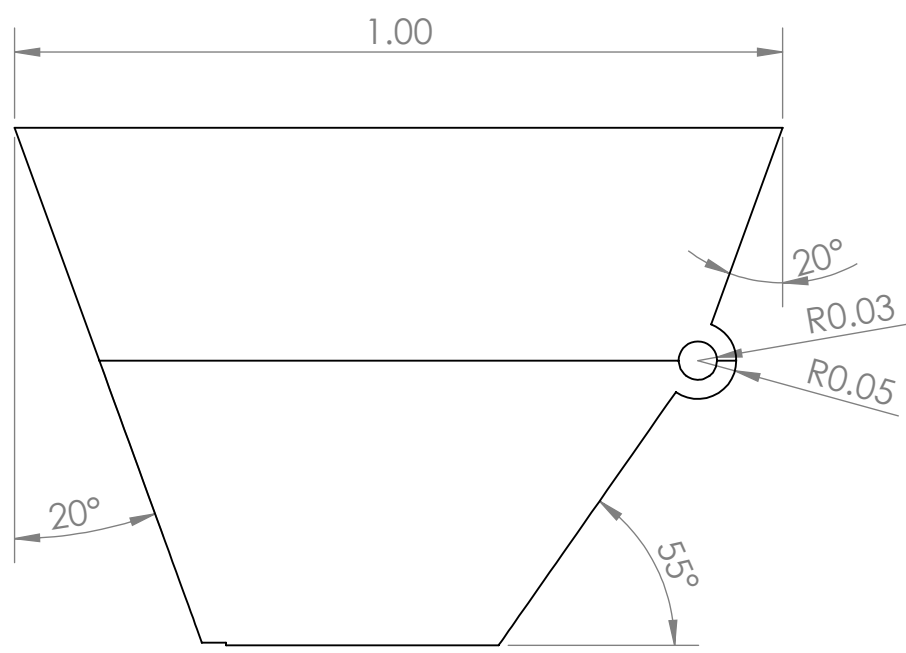
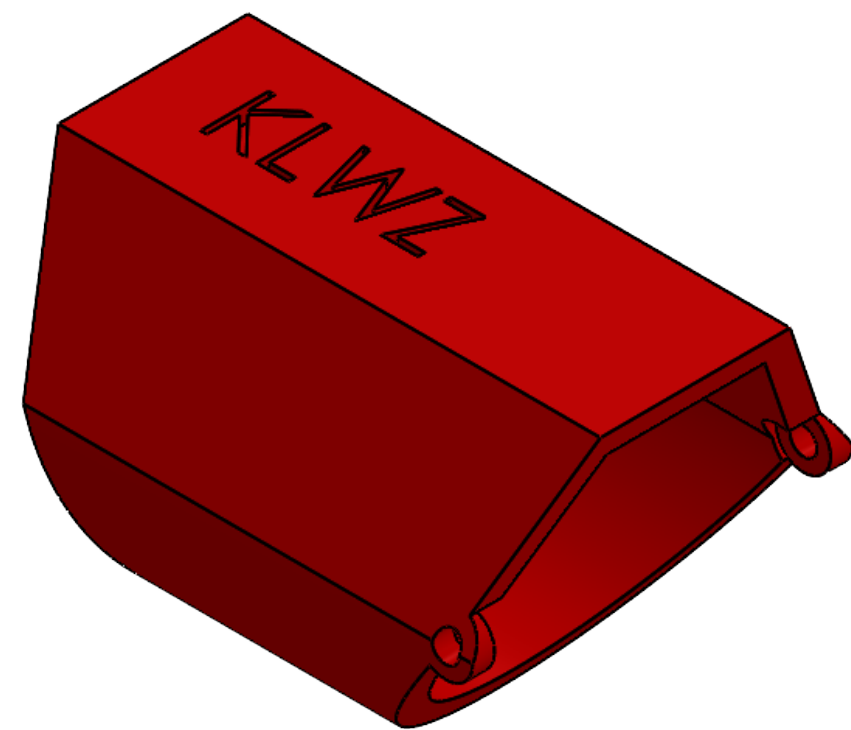
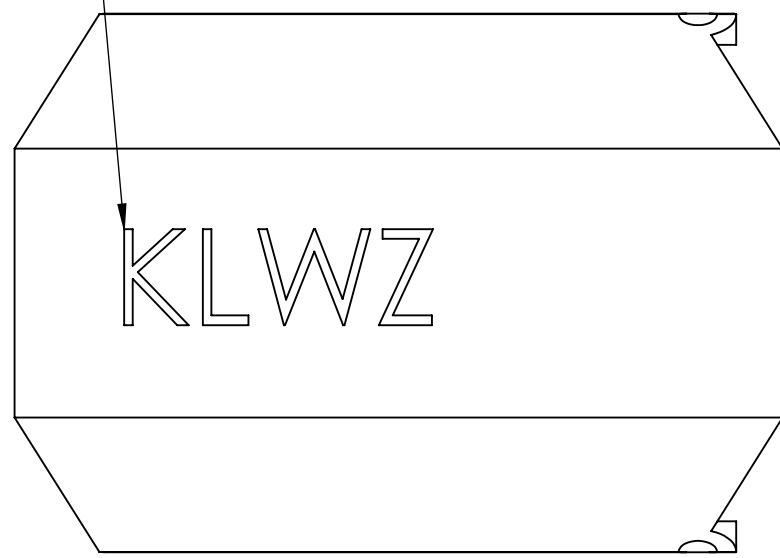
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								Stark Industries			
								TITLE: Middle Tip-KLWZ			
DRAWN		William Zhou		SIGNATURE		William Zhou		DATE		12/21/22	
CHK'D		Kenneth Liu		SIGNATURE		Kenneth Liu		DATE		12/21/22	
APPV'D		NA		NA		NA		NA		NA	
MFG		NA		NA		NA		NA		NA	
Q.A		NA		NA		NA		MATERIAL:		DWG NO.	
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								A3			
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8 7 6 5 4 3 2 1

F
E
D
C
B
A

Wall Thickness is 0.05

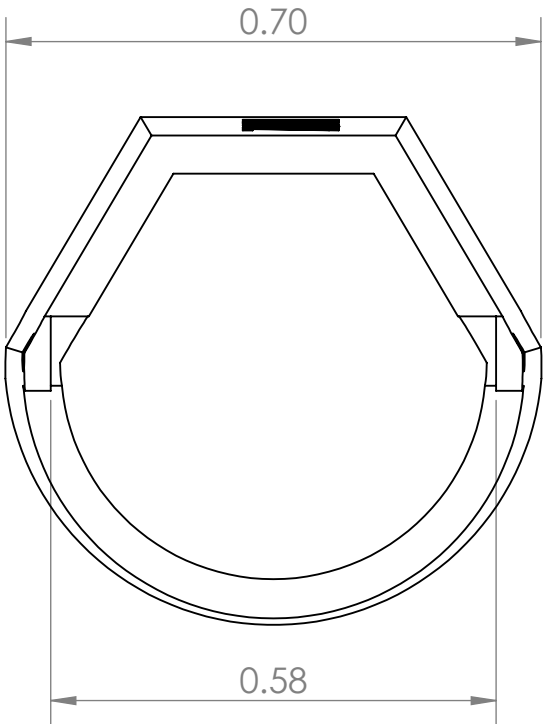
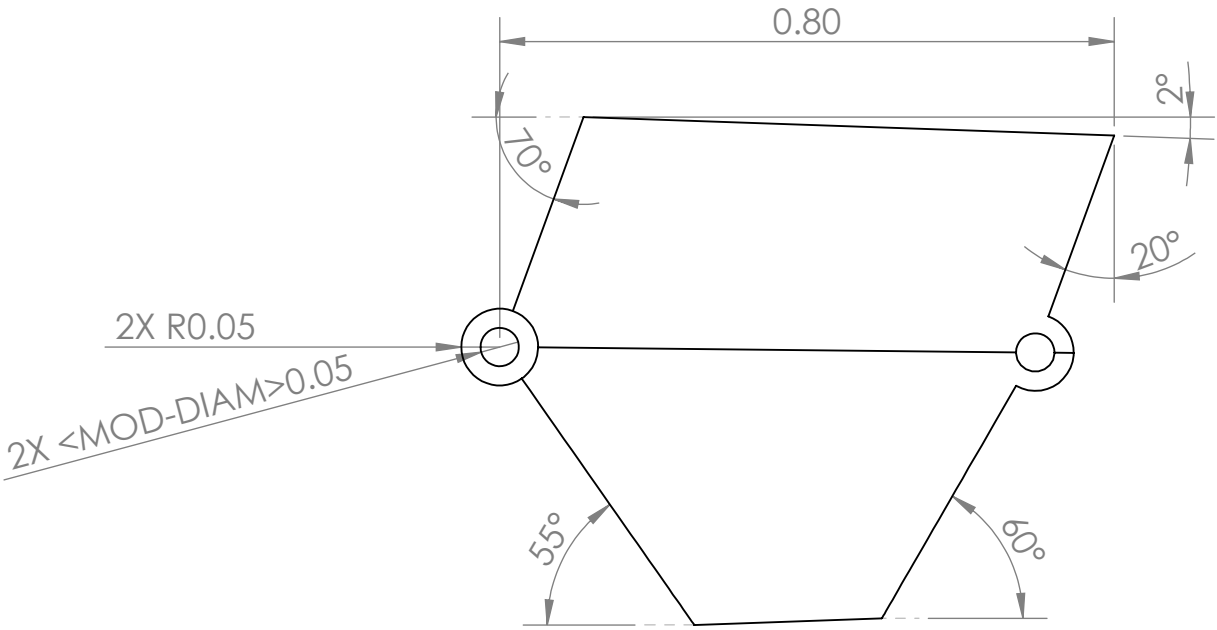
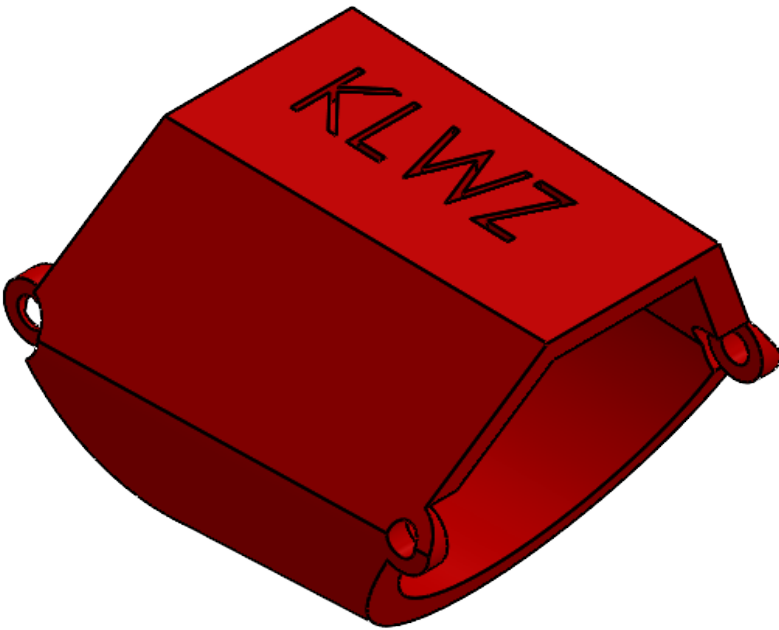
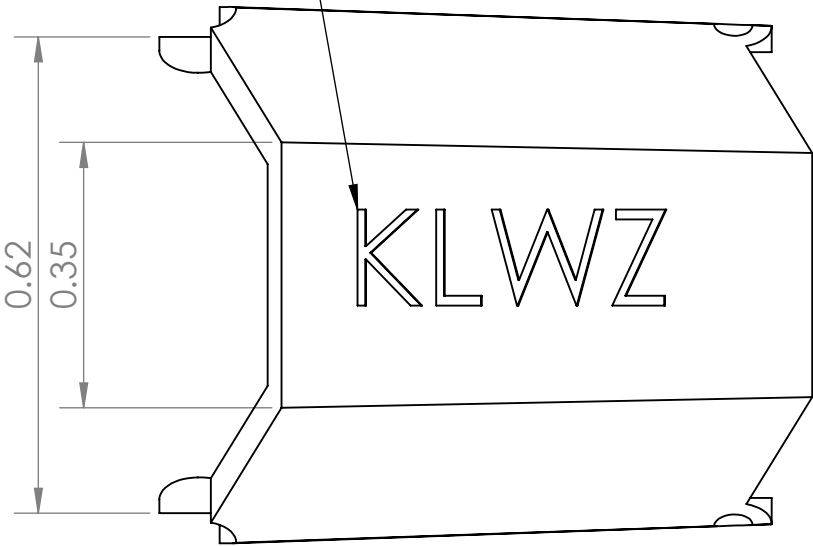
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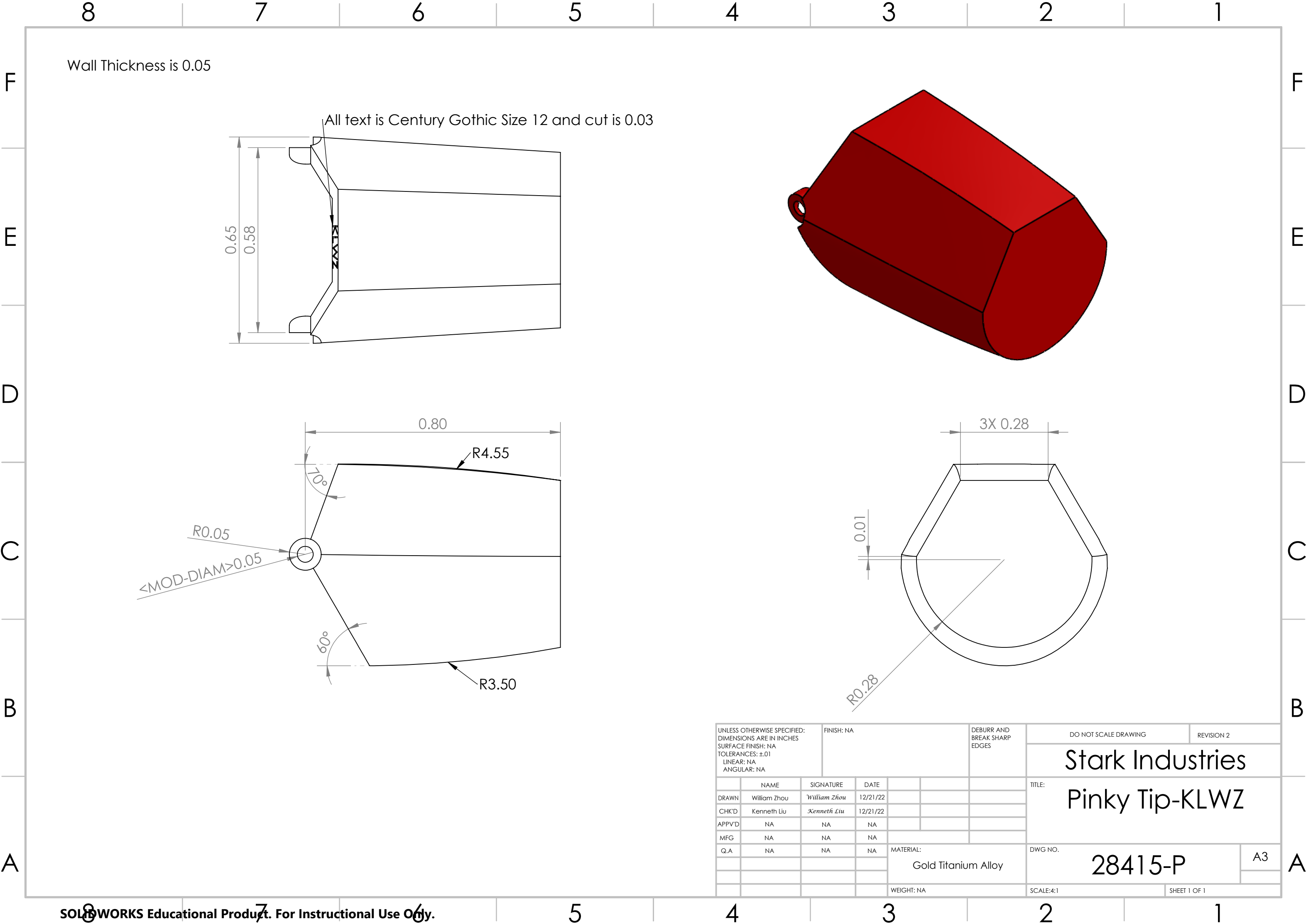
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							Stark Industries					
							TITLE: Pinky Bottom-KLWZ					
DRAWN William Zhou William Zhou 12/21/22							DWG NO. 28415-N A3					
CHK'D Kenneth Liu Kenneth Liu 12/21/22												
APPV'D NA NA NA												
MFG NA NA NA												
Q.A NA NA NA												
							MATERIAL: Gold Titanium Alloy					
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Wall Thickness is 0.05

All text is Century Gothic Size 12 and cut is 0.03

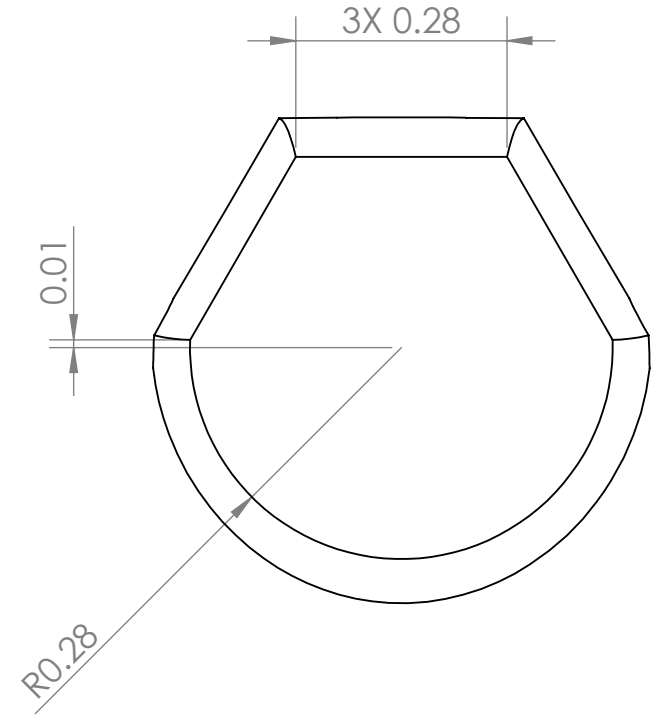
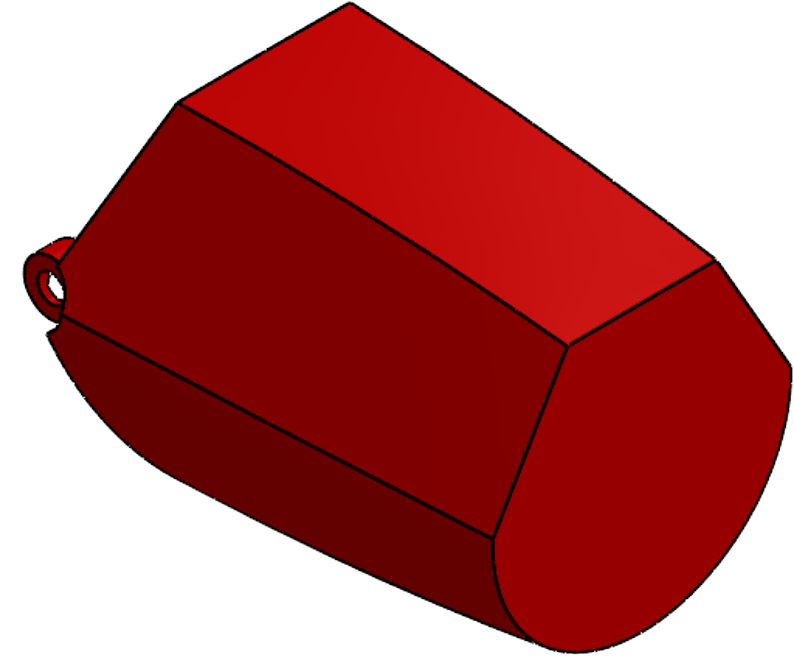
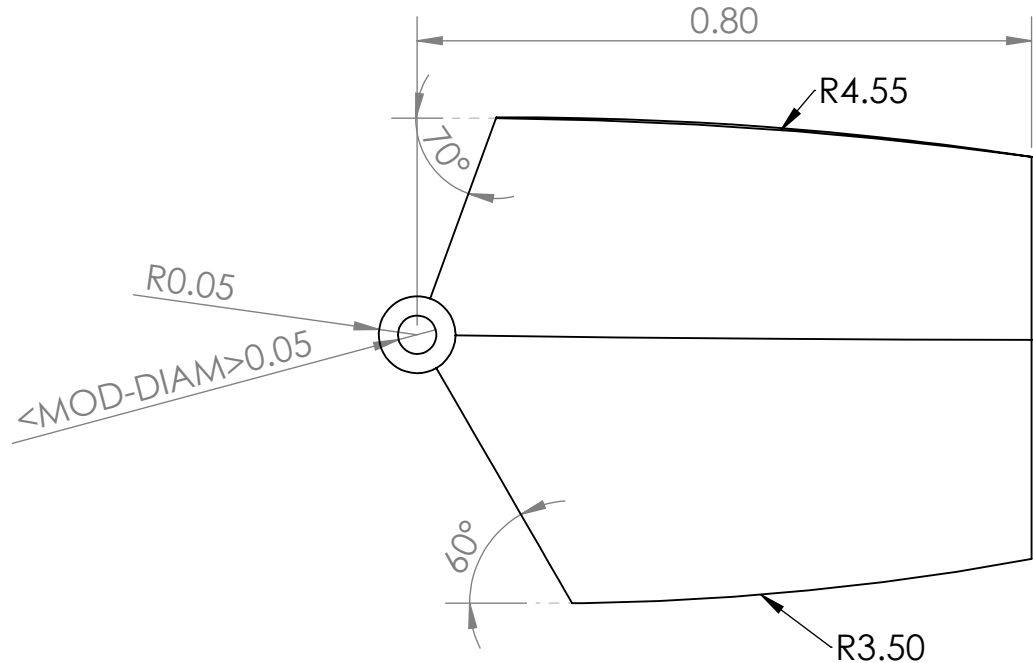
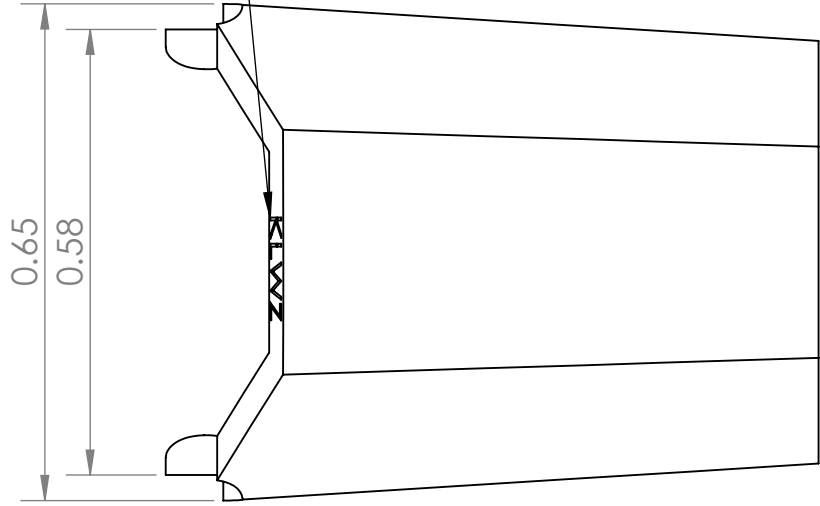


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								Stark Industries			
	NAME		SIGNATURE		DATE				TITLE:		
DRAWN	William Zhou		William Zhou		12/21/22				Pinky Middle-KLWZ		
CHK'D	Kenneth Liu		Kenneth Liu		12/21/22						
APPV'D	NA		NA		NA						
MFG	NA		NA		NA						
Q.A	NA		NA		NA		MATERIAL:		DWG NO.		
							Gold Titanium Alloy		28415-O		
									A3		
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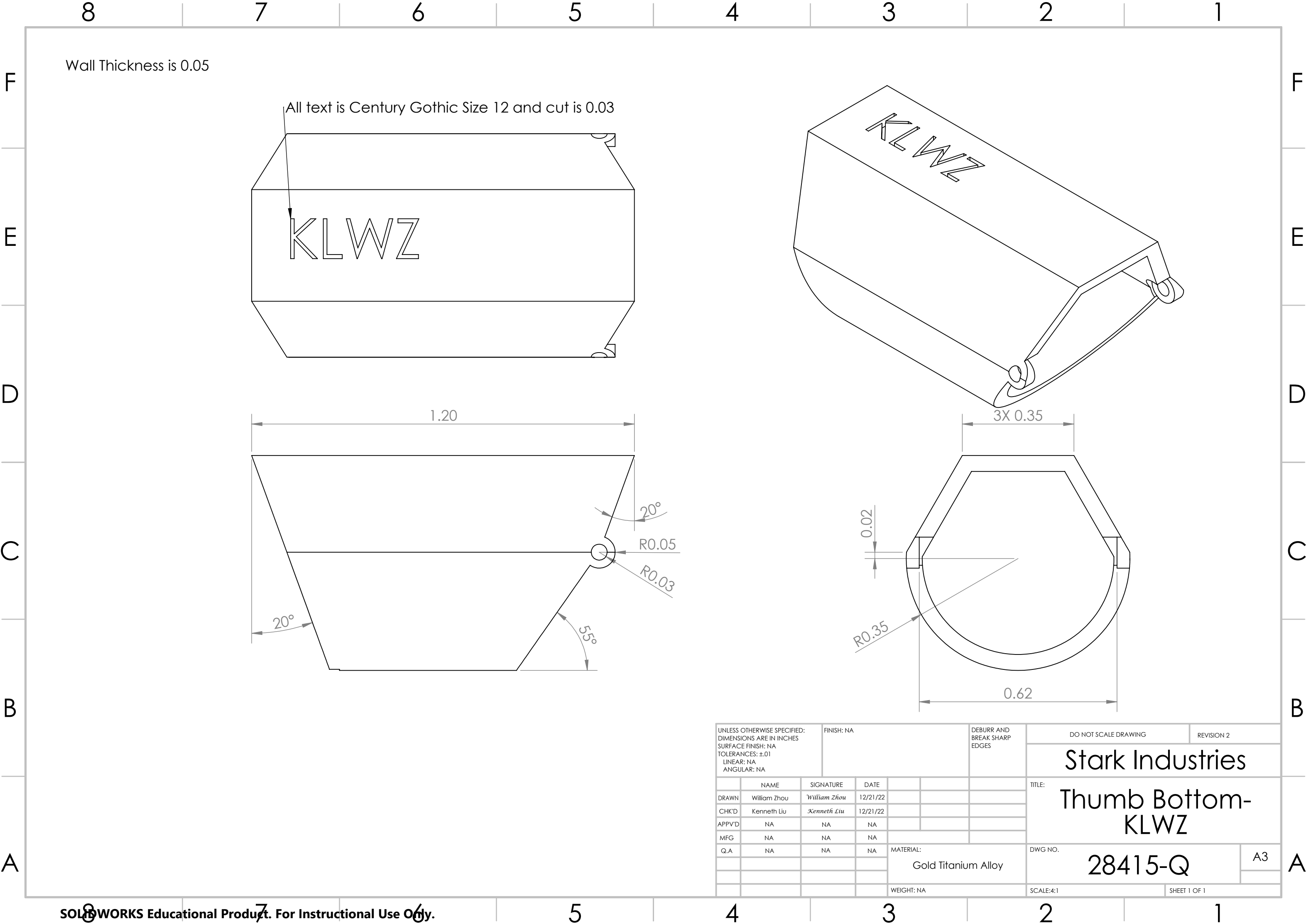


Wall Thickness is 0.05

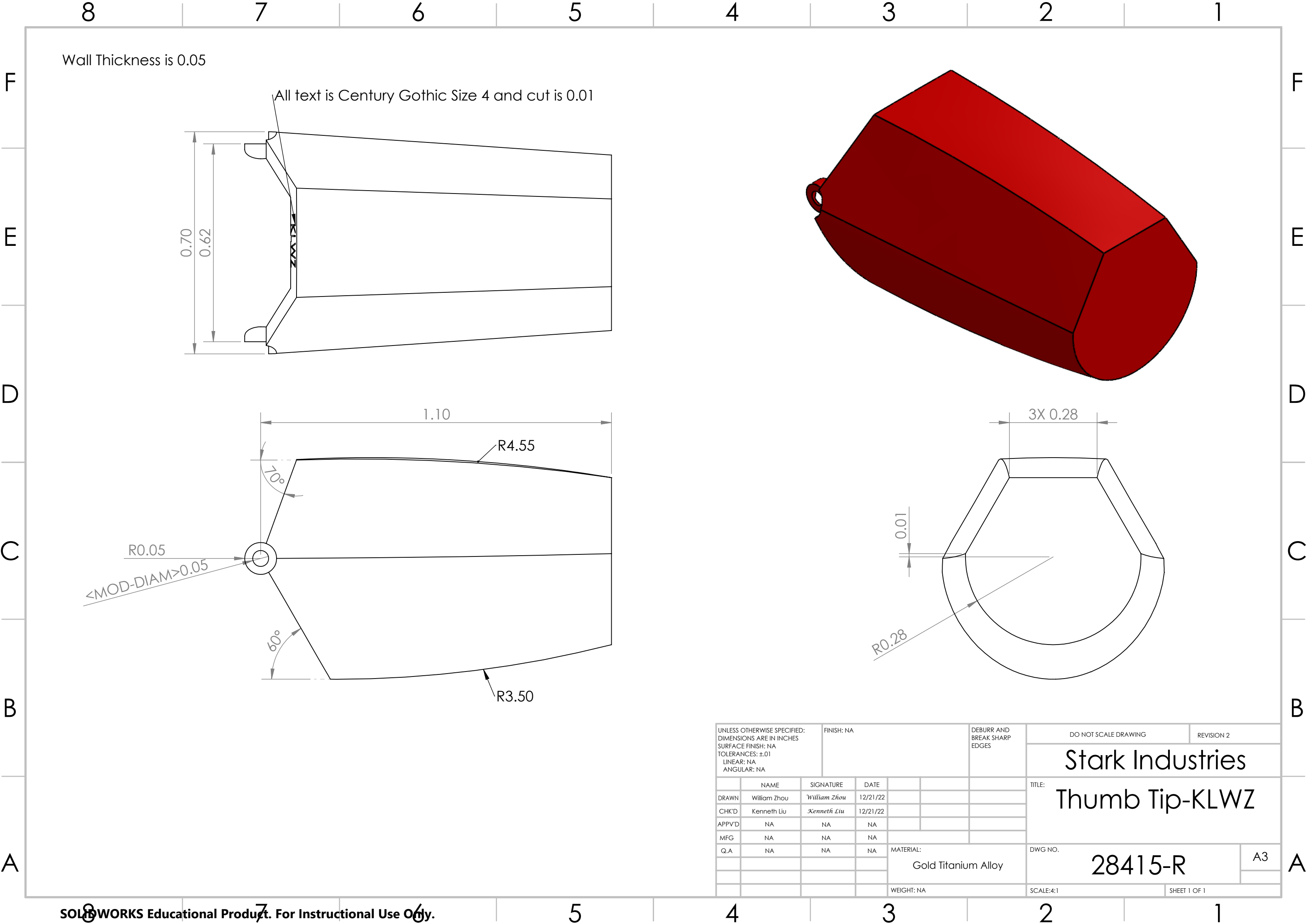
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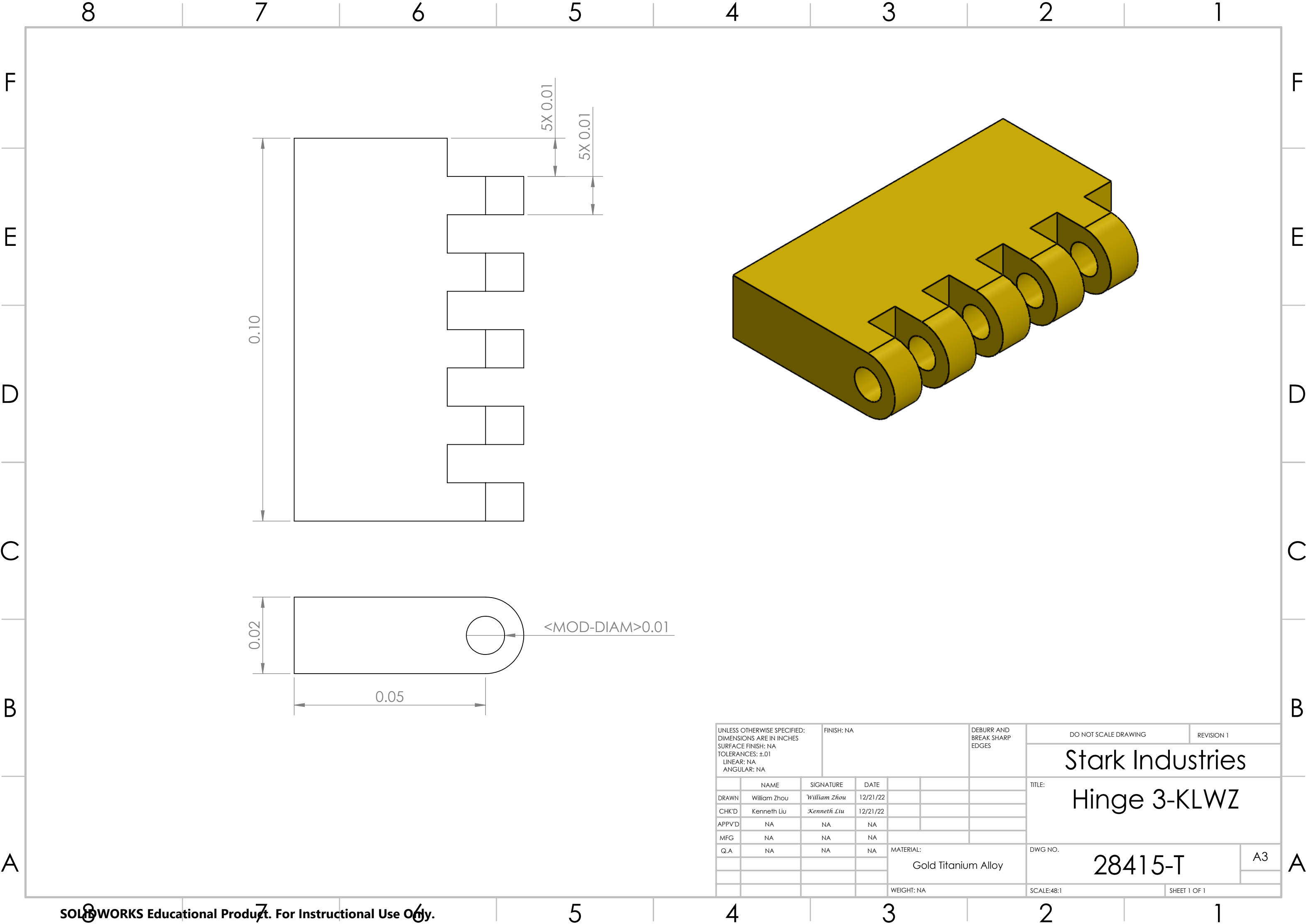


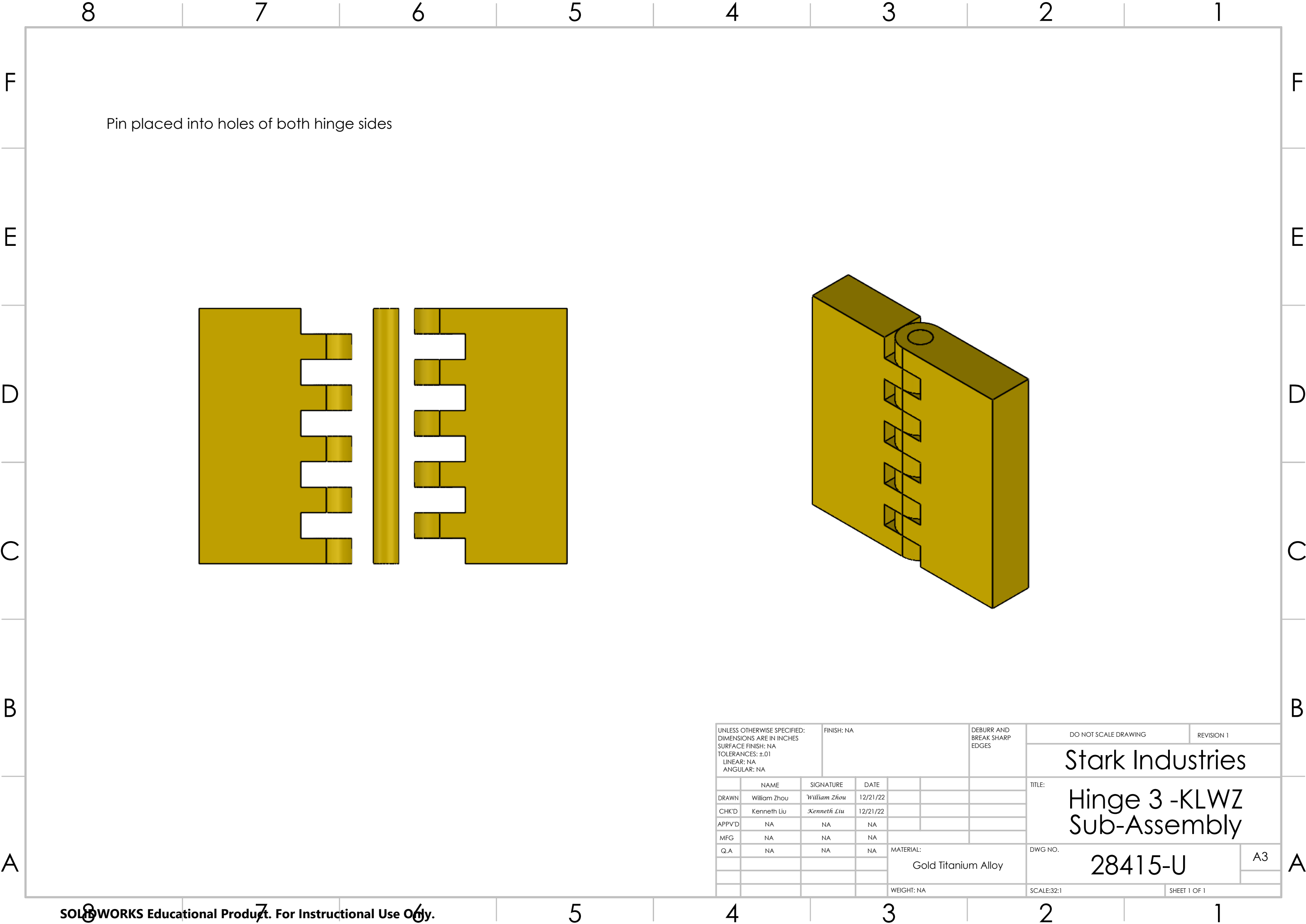
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								Stark Industries			
								TITLE:			
								Pinky Tip-KLWZ			
DRAWN William Zhou William Zhou 12/21/22											
CHK'D Kenneth Liu Kenneth Liu 12/21/22											
APPV'D NA NA NA											
MFG NA NA NA											
Q.A NA NA NA								MATERIAL:			
								Gold Titanium Alloy			
								WEIGHT: NA			
								SCALE:4:1			
								SHEET 1 OF 1			
								A3			



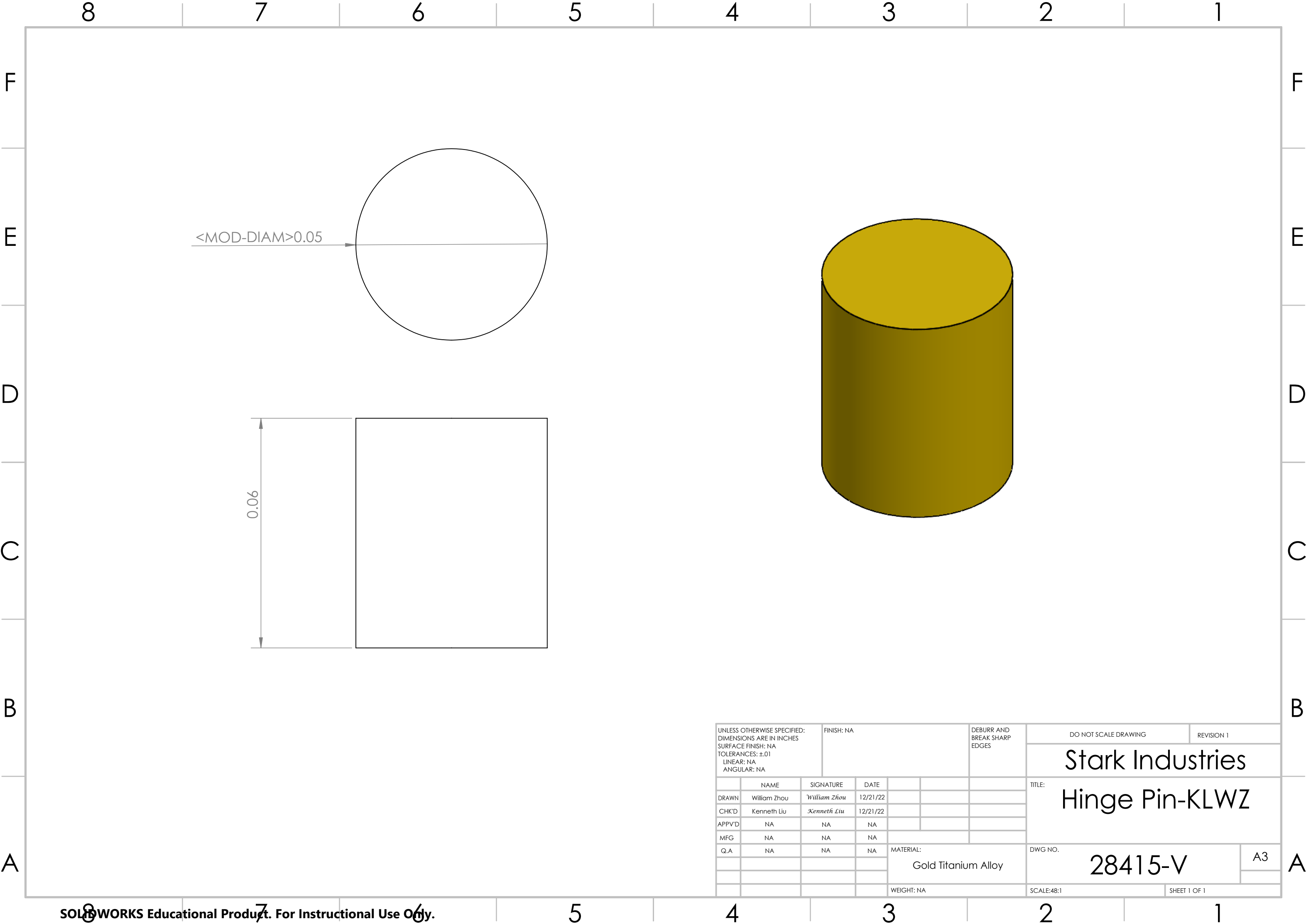
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								Stark Industries			
	NAME		SIGNATURE		DATE				TITLE:		
DRAWN	William Zhou		William Zhou		12/21/22				Thumb Bottom-		
CHK'D	Kenneth Liu		Kenneth Liu		12/21/22				KLWZ		
APPV'D	NA		NA		NA						
MFG	NA		NA		NA						
Q.A	NA		NA		NA		MATERIAL:		DWG NO.		
							Gold Titanium Alloy		28415-Q		
									A3		
							WEIGHT: NA		SCALE:4:1		
									SHEET 1 OF 1		

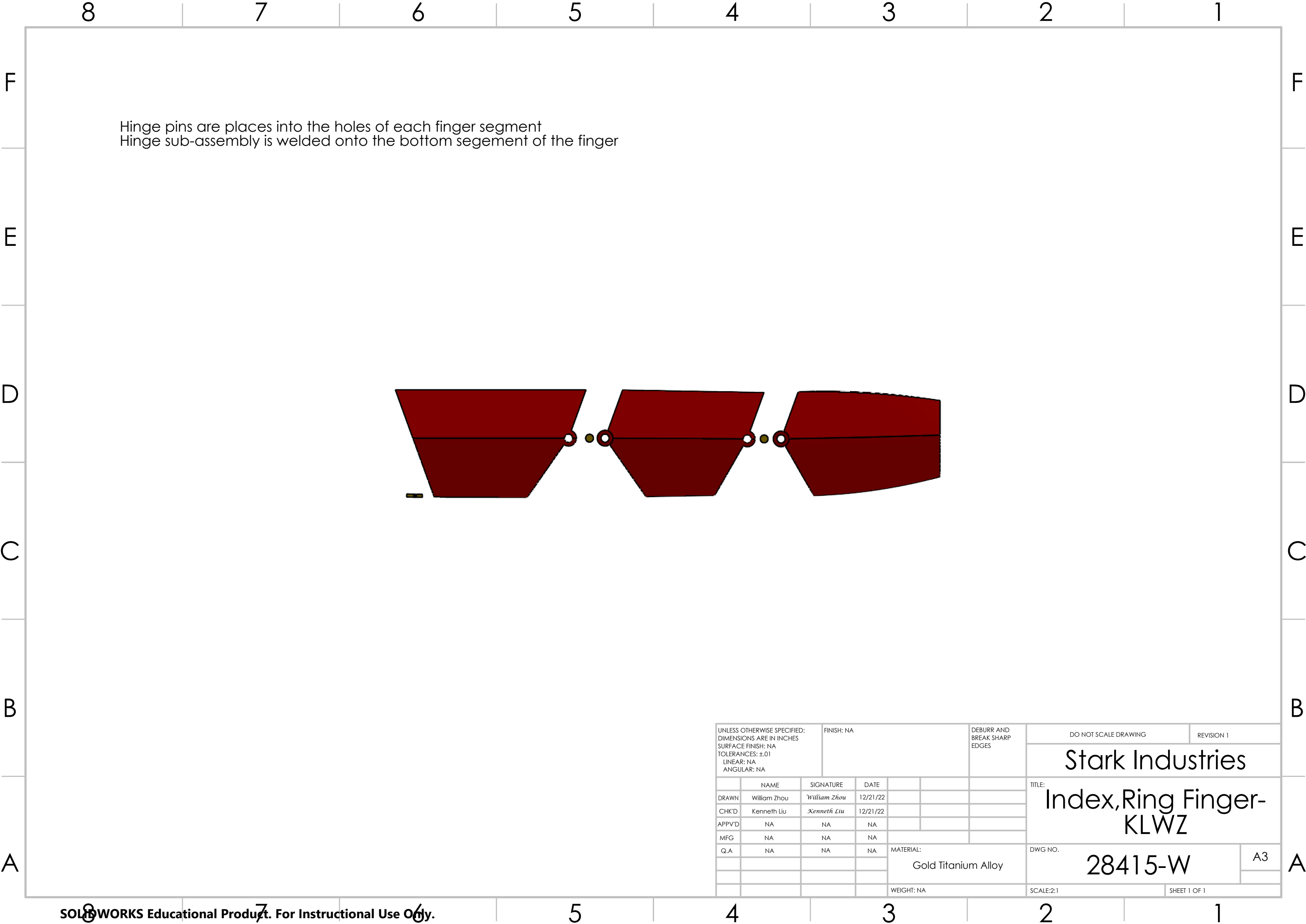




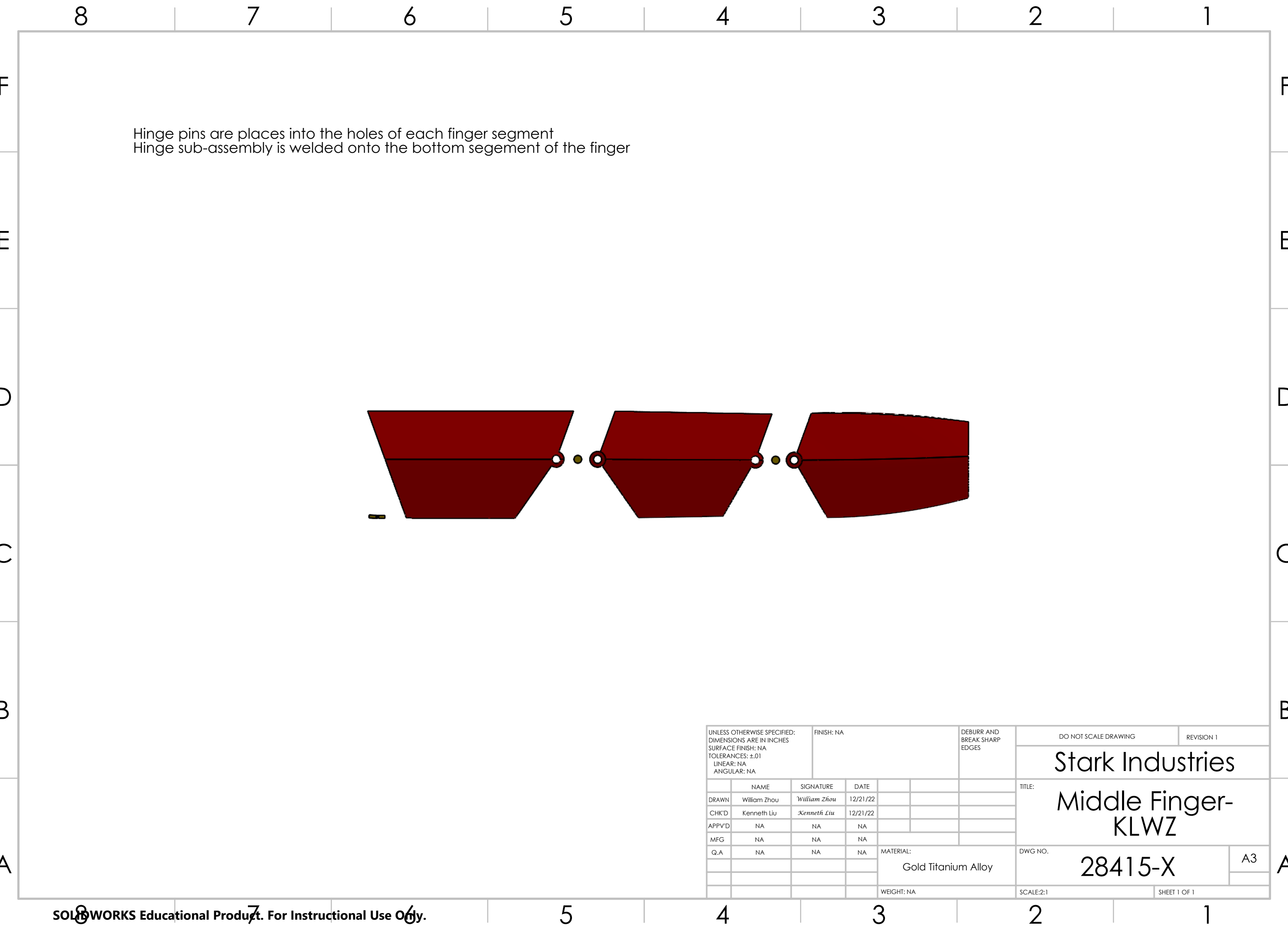


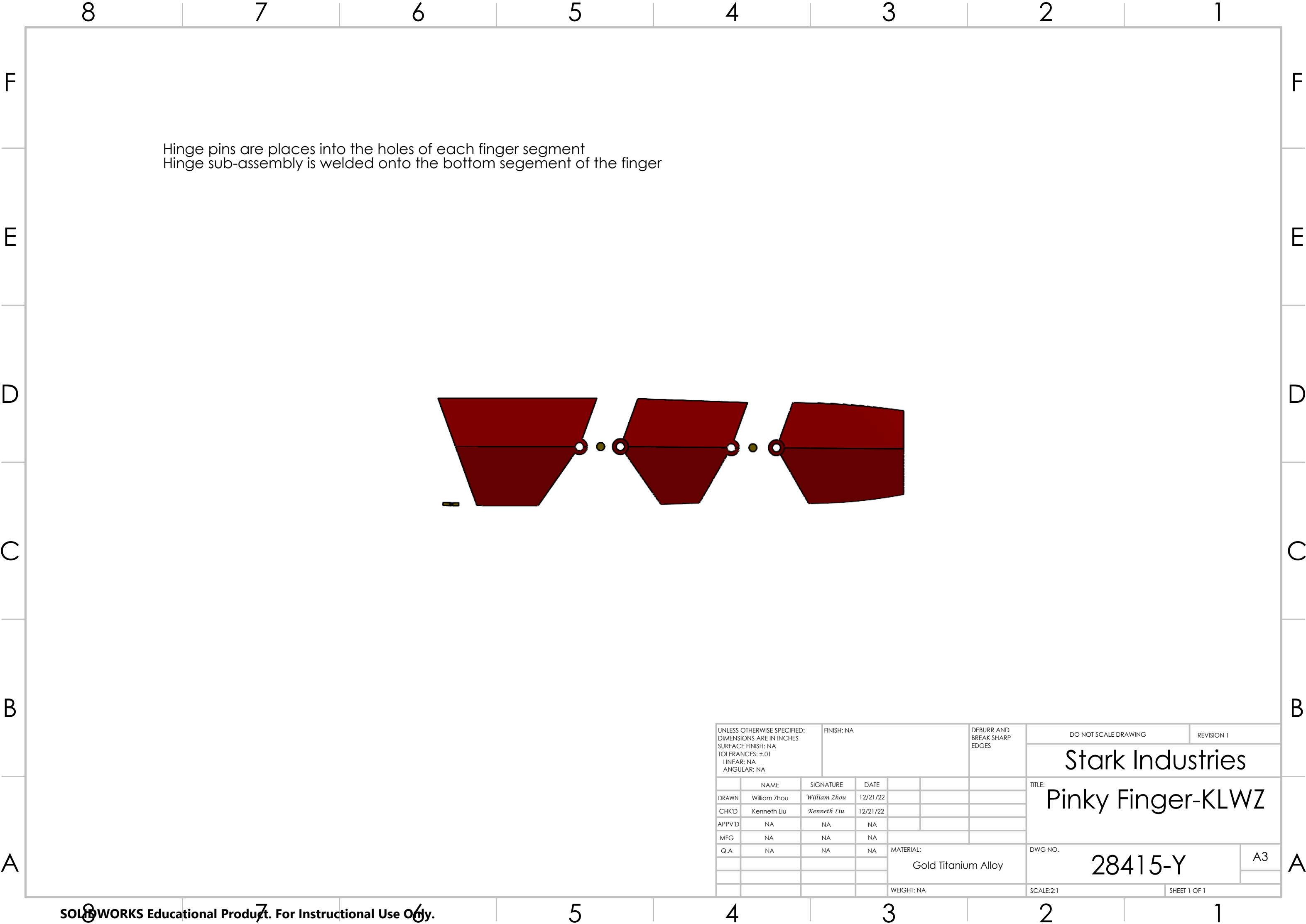
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								Stark Industries					
								Hinge 3 -KLWZ Sub-Assembly					
								28415-U				A3	
								SCALE:32:1				SHEET 1 OF 1	
								WEIGHT: NA					
								Gold Titanium Alloy					





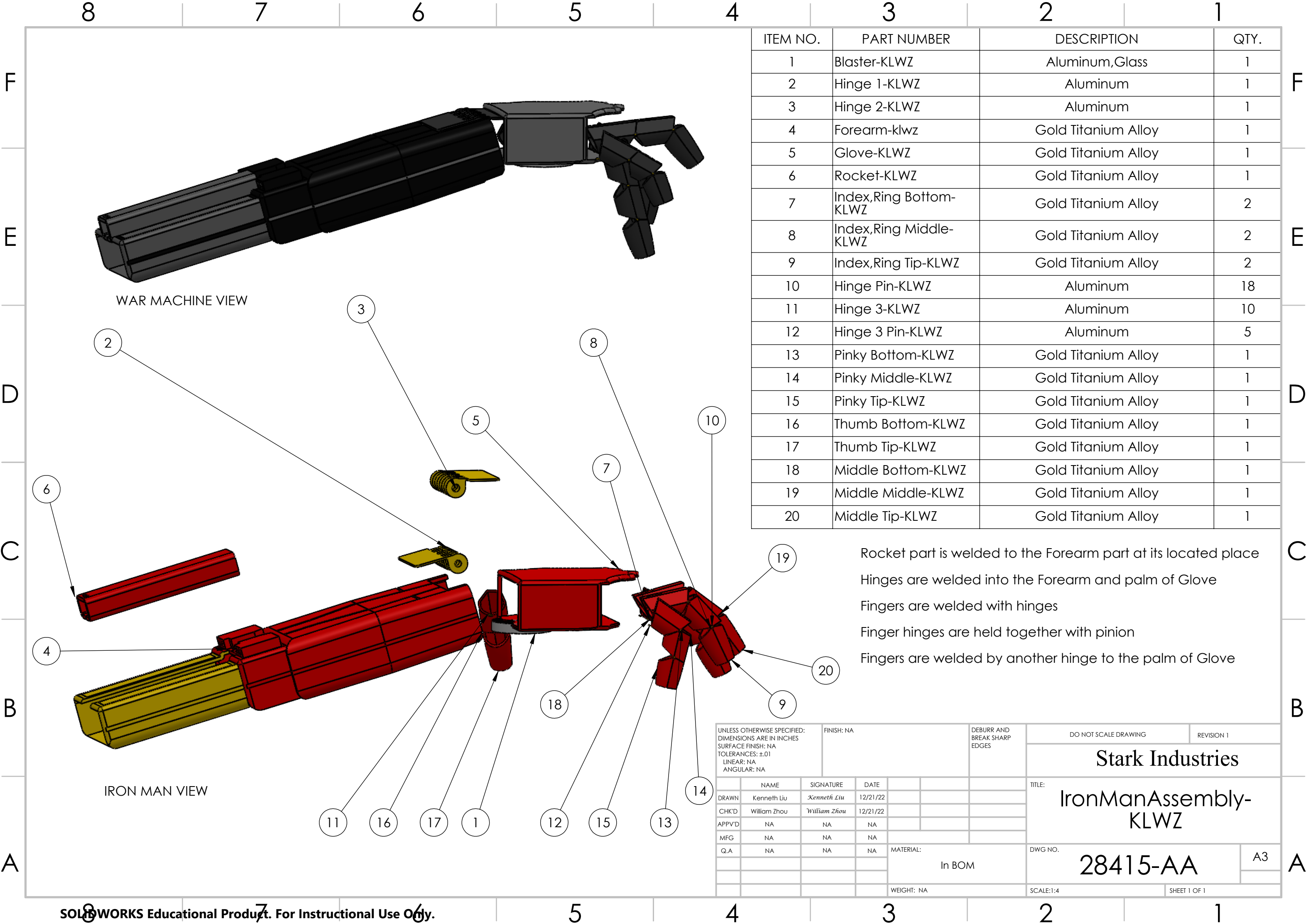
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							Stark Industries				
	NAME	SIGNATURE	DATE				TITLE: Index, Ring Finger- KLWZ				
DRAWN	William Zhou	William Zhou	12/21/22								
CHK'D	Kenneth Liu	Kenneth Liu	12/21/22								
APPV'D	NA	NA	NA								
MFG	NA	NA	NA								
Q.A	NA	NA	NA	MATERIAL:			DWG NO.		A3		
				Gold Titanium Alloy			28415-W				
				WEIGHT: NA			SCALE:2:1		SHEET 1 OF 1		





UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES SURFACE FINISH: NA TOLERANCES: ±.01 LINEAR: NA ANGULAR: NA				FINISH: NA		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		REVISION 1	
								Stark Industries			
	NAME		SIGNATURE		DATE				TITLE:		
DRAWN	William Zhou		William Zhou		12/21/22				Pinky Finger-KLWZ		
CHK'D	Kenneth Liu		Kenneth Liu		12/21/22						
APPV'D	NA		NA		NA						
MFG	NA		NA		NA						
Q.A	NA		NA		NA		MATERIAL:		DWG NO.		
							Gold Titanium Alloy		28415-Y		
									A3		
							WEIGHT: NA		SCALE:2:1		
									SHEET 1 OF 1		

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES SURFACE FINISH: NA TOLERANCES: ±.01 LINEAR: NA ANGULAR: NA				FINISH: NA		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		REVISION 1	
								Stark Industries			
								TITLE: Thumb Finger- KLWZ			
DRAWN		William Zhou	SIGNATURE	William Zhou	DATE	2/21/22					
CHK'D		Kenneth Liu	SIGNATURE	Kenneth Liu	DATE	2/21/22					
APPV'D		NA	SIGNATURE	NA	DATE	NA					
MFG		NA	SIGNATURE	NA	DATE	NA					
Q.A		NA	SIGNATURE	NA	DATE	NA	MATERIAL:		DWG NO.		A3
							Gold Titanium Alloy		28415-Z		
							WEIGHT: NA		SCALE:2:1		SHEET 1 OF 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Blaster-KLWZ	Aluminum,Glass	1
2	Hinge 1-KLWZ	Aluminum	1
3	Hinge 2-KLWZ	Aluminum	1
4	Forearm-klwz	Gold Titanium Alloy	1
5	Glove-KLWZ	Gold Titanium Alloy	1
6	Rocket-KLWZ	Gold Titanium Alloy	1
7	Index,Ring Bottom-KLWZ	Gold Titanium Alloy	2
8	Index,Ring Middle-KLWZ	Gold Titanium Alloy	2
9	Index,Ring Tip-KLWZ	Gold Titanium Alloy	2
10	Hinge Pin-KLWZ	Aluminum	18
11	Hinge 3-KLWZ	Aluminum	10
12	Hinge 3 Pin-KLWZ	Aluminum	5
13	Pinky Bottom-KLWZ	Gold Titanium Alloy	1
14	Pinky Middle-KLWZ	Gold Titanium Alloy	1
15	Pinky Tip-KLWZ	Gold Titanium Alloy	1
16	Thumb Bottom-KLWZ	Gold Titanium Alloy	1
17	Thumb Tip-KLWZ	Gold Titanium Alloy	1
18	Middle Bottom-KLWZ	Gold Titanium Alloy	1
19	Middle Middle-KLWZ	Gold Titanium Alloy	1
20	Middle Tip-KLWZ	Gold Titanium Alloy	1

Rocket part is welded to the Forearm part at its located place
Hinges are welded into the Forearm and palm of Glove
Fingers are welded with hinges
Finger hinges are held together with pinion
Fingers are welded by another hinge to the palm of Glove

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES SURFACE FINISH: NA TOLERANCES: ±.01 LINEAR: NA ANGULAR: NA				FINISH: NA		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		REVISION 1	
								Stark Industries			
		NAME	SIGNATURE	DATE				TITLE:			
DRAWN	Kenneth Liu	<i>Kenneth Liu</i>	12/21/22					IronManAssembly- KLWZ			
CHK'D	William Zhou	<i>William Zhou</i>	12/21/22								
APPV'D	NA	NA	NA								
MFG	NA	NA	NA								
Q.A	NA	NA	NA	MATERIAL: In BOM				DWG NO. 28415-AA		A3	
						WEIGHT: NA		SCALE:1:4		SHEET 1 OF 1	