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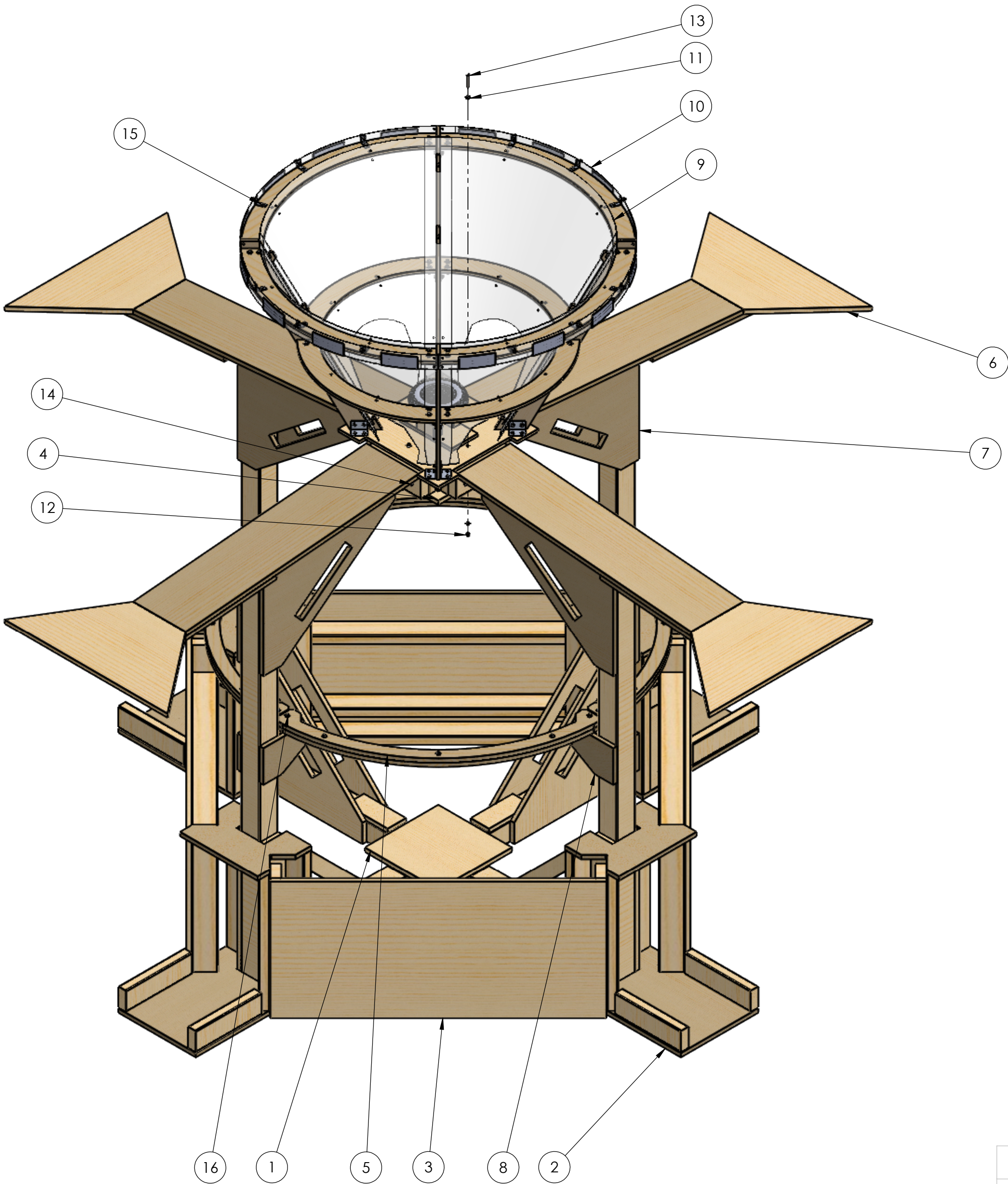
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Hardware Needed:  
#8 x 2" Long Screw - Qty 48  
#8 x 2.5" Long Screw - Qty 64  
Optional, but recommended: Safety Edging such as pool noodles or baby proofing

ITEM NO.	PART NUMBER	DESCRIPTION	
1	TE-22110	HUB - Complex Build - Base Assembly	1
2	TE-22120	HUB - Complex Build - Lower Exit Assembly	4
3	TE-22130	HUB - Complex Build - Fender Face Assembly	4
4	TE-22140	HUB - Complex Build - Connection Box Assembly	1
5	TE-22150	HUB - Complex Build - Lower Hub Ring Assembly	4
6	TE-22160	HUB - Complex Build - Upper Exit Assembly	4
7	TE-22170	HUB - Complex Build - Leg Assembly	4
8	TE-22180	HUB - Complex Build - Lower Hub Ring to Leg Assembly	4
9	TE-22190	Hub - Complex Build - Upper Hub Assembly	1
10	TE-22200	Hub - Complex Build - Upper Hub Vision Assembly	4
11	washer_flat_.25	Flat Washer for 1/4" Screw	52
12	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	32
13	hex_.25_20_2	Steel Hex Head Bolt 1/4"-20 x 2" long, fully threaded	4
14	hex_.25_20_3.5_partial	Steel Hex Head Bolt, 1/4"-20 x 3.5", partially threaded	8
15	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 1" long, fully threaded	12
16	hex.25_20_5.5	Steel Hex Head Bolt, 1/4"-20 x 5.5", partially threaded	8

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	<div></div>		
		DRAWN	KAMC	1/4/2022			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125		PROPRIETARY AND CONFIDENTIAL			TITLE:		
		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			HUB - Complex Build - Full Hub Assembly		
MATERIAL/FINISH:		COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
					C	TE-22100	
DO NOT SCALE DRAWING					SCALE: 1:12		SHEET 1 OF 7

- Note:
- If you are planning to disassemble frequently, you may want to consider using bolted connections instead of screws. It is helpful to consider ceiling height and ability to move assembly through doors before fastening sub-assemblies together.
  - Bolts spec'd as partially threaded can be replaced with fully threaded bolt of the same length.
  - TE-22190 can be replaced with TE-22190-AMActive (if pairing with AndyMark's Motorized Agitator AM-4674) or TE-22190-AMPassive (if pairing with AndyMark's Passive Agitator AM-4673).





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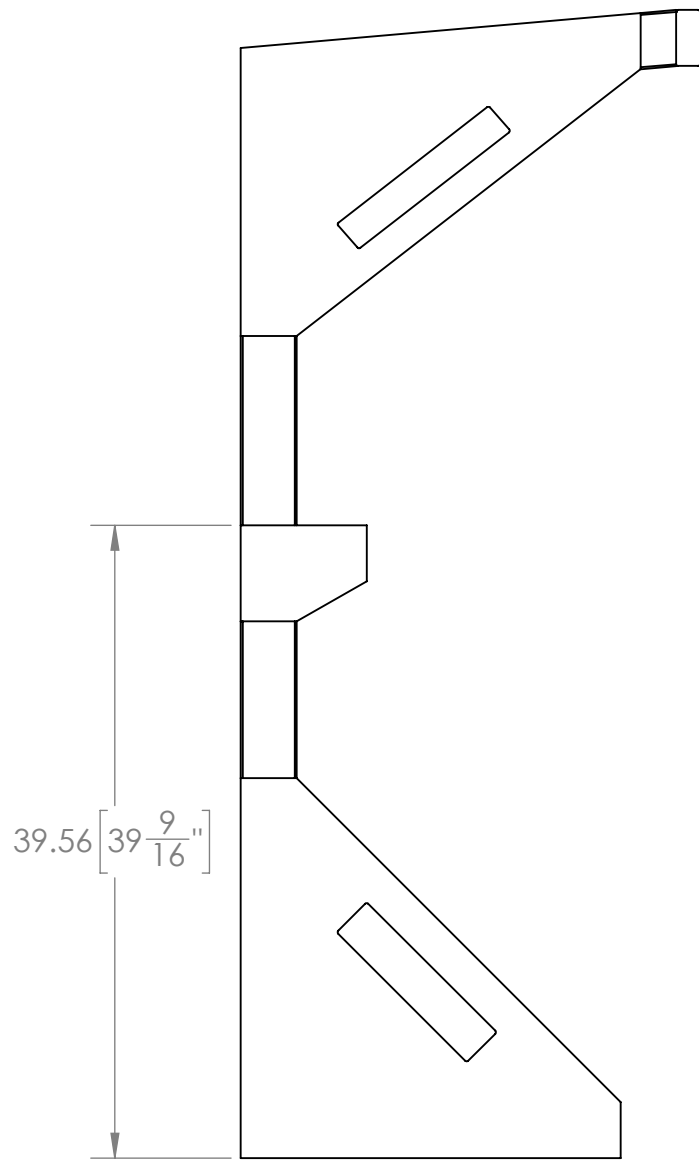
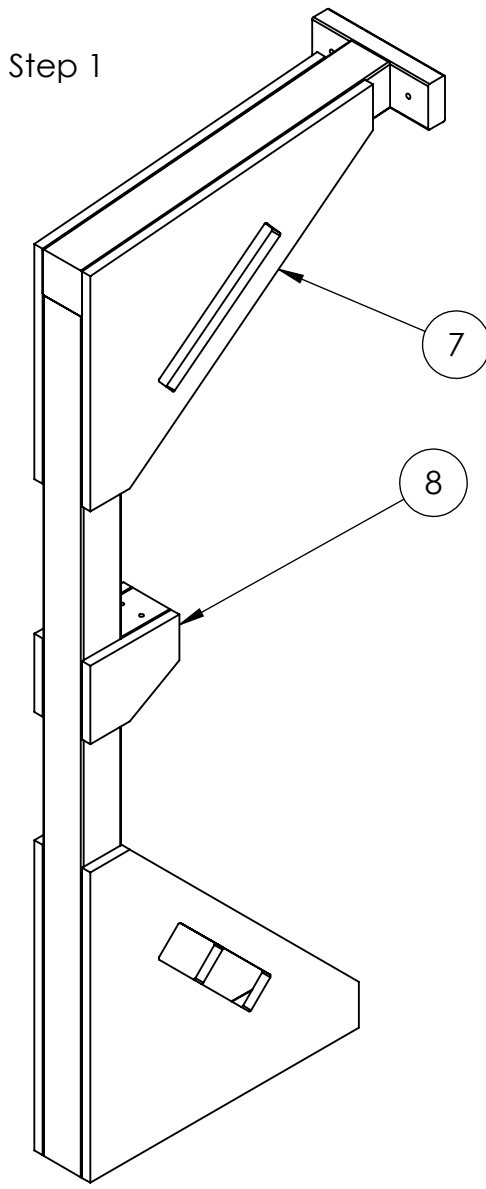
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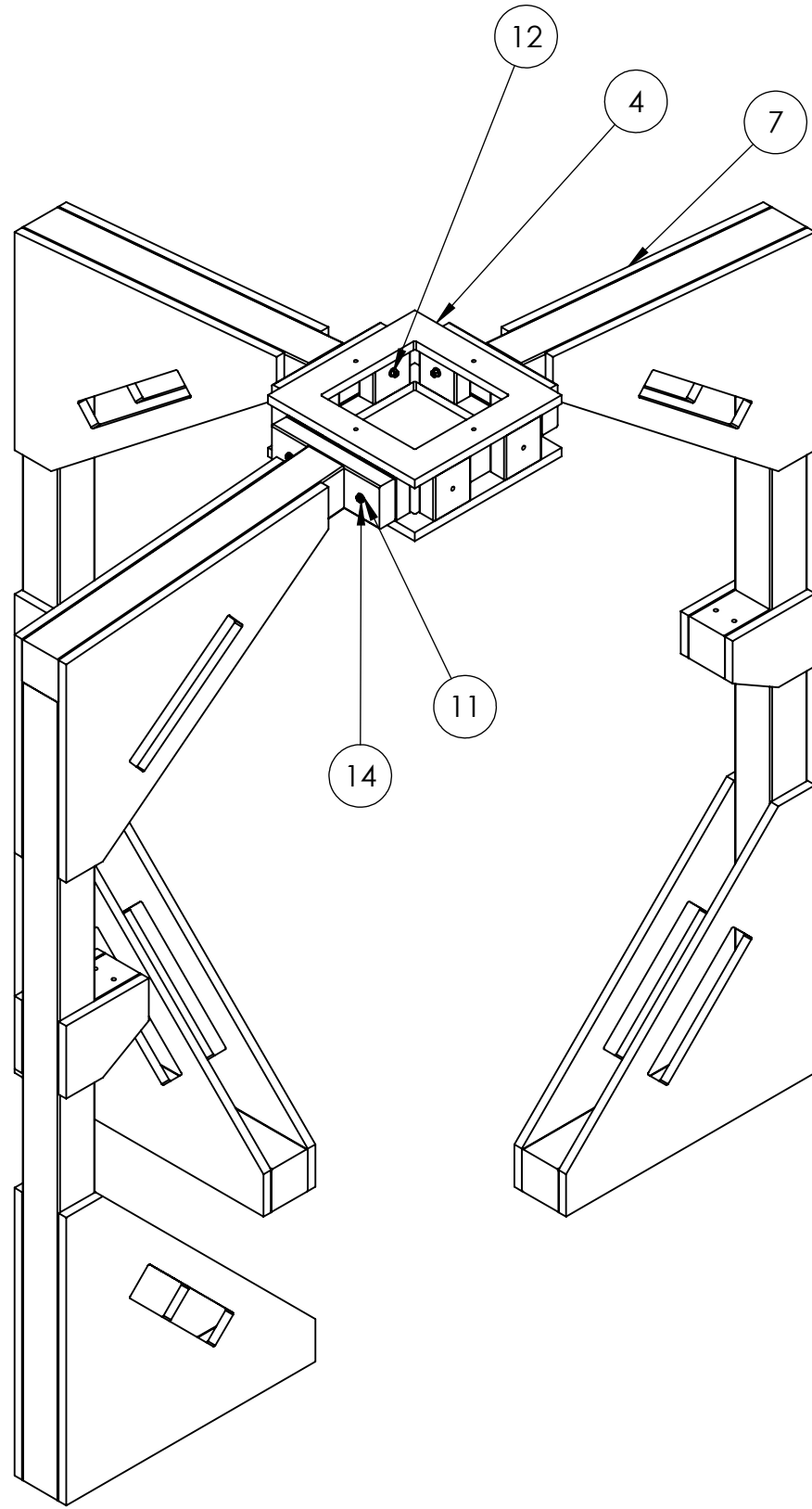
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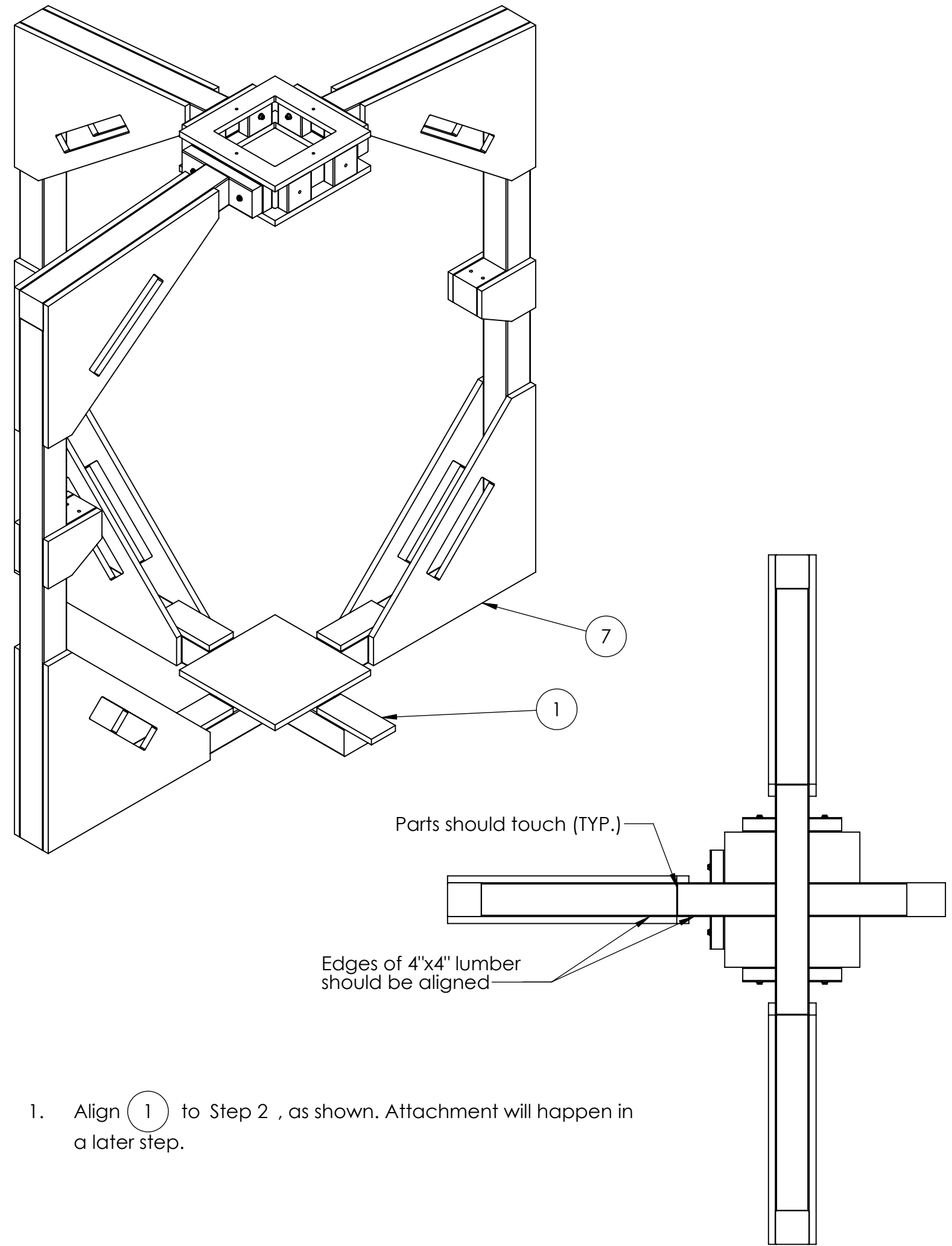
1. Align (8) to (7), as shown.
2. Connect using 2.5" long screws. It is recommended to use 8x screws, 4x into each side.
3. Repeat 3x, for a total of 4x sub-assemblies.

Step 2





1. Align 3x assemblies from Step 1 to (4), as shown.
2. Loosely connect using 2x (14), 4x (11), and 2x (12) per (7). Hardware will be tightened in a later step.

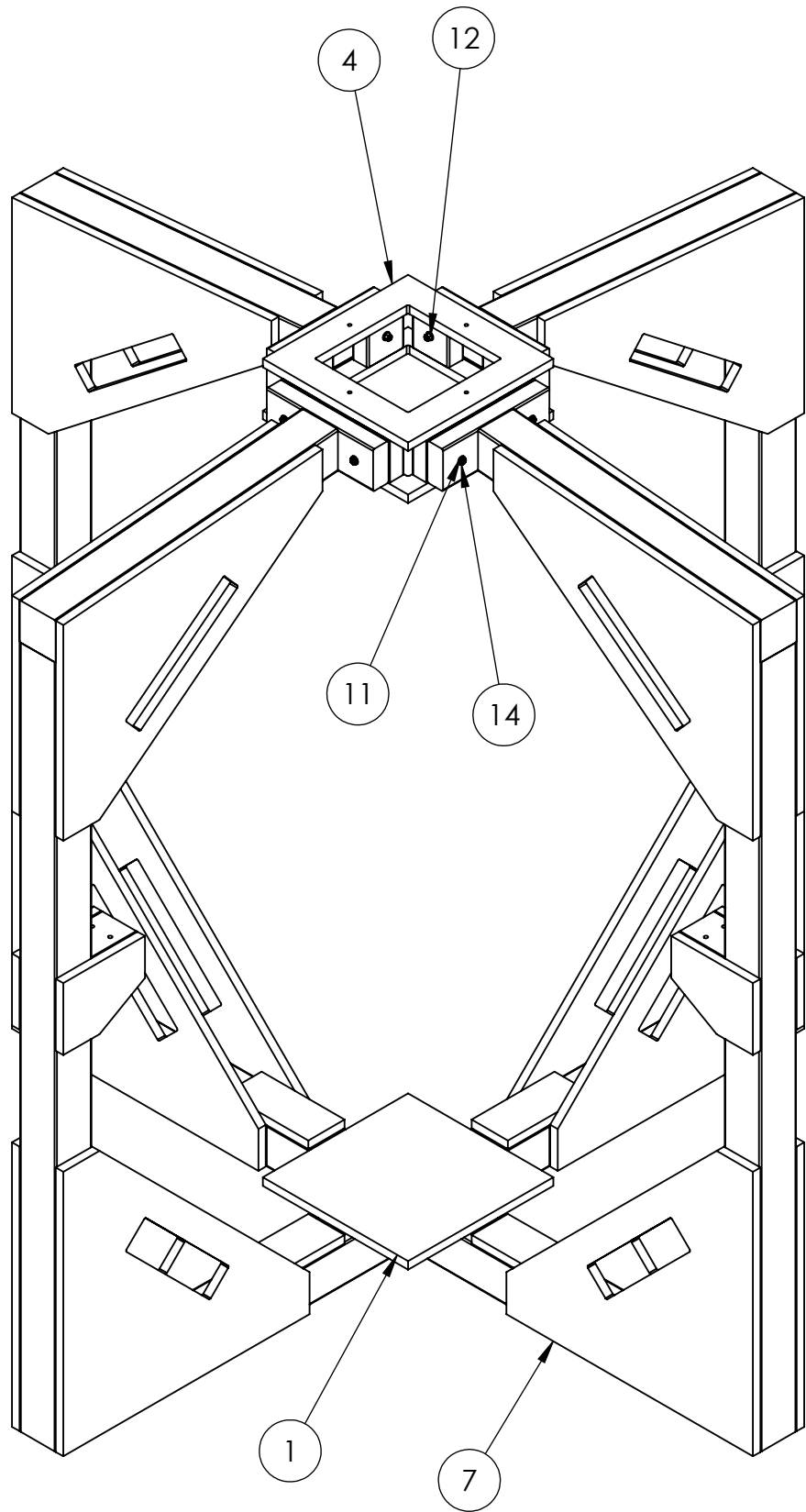
Step 3



1. Align (1) to Step 2, as shown. Attachment will happen in a later step.

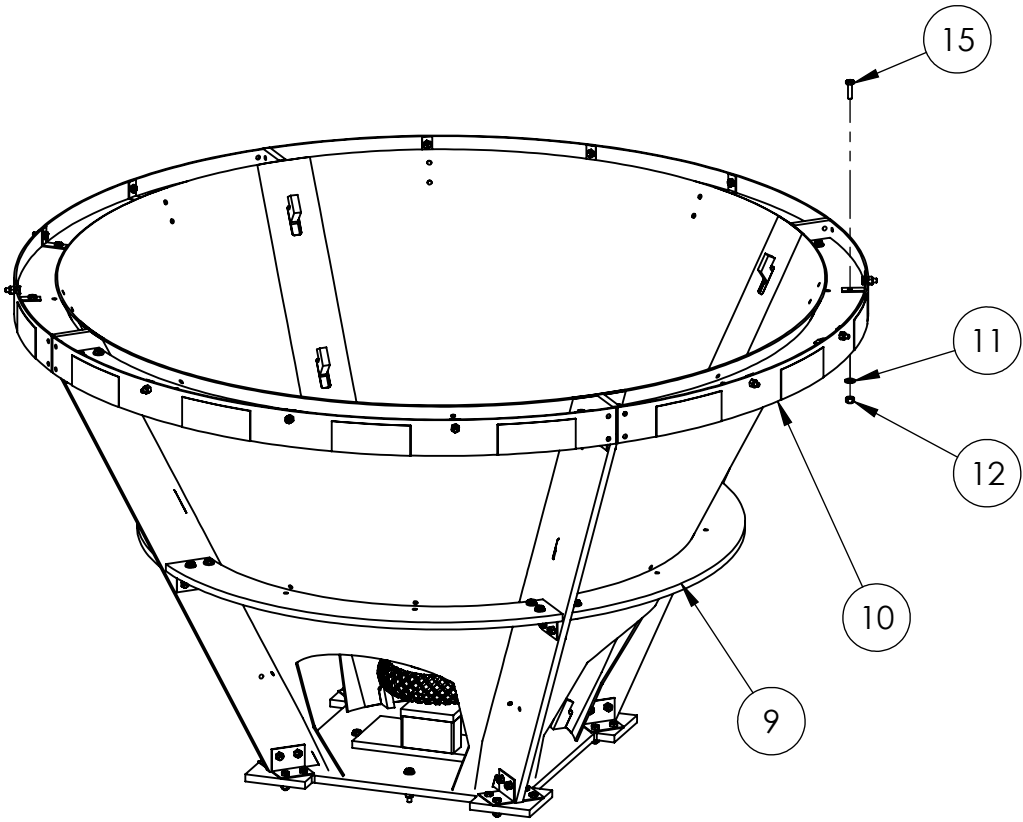
UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>   DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div> <div>TITLE: HUB - Complex Build - Full Hub Assembly</div> <div><div>SIZE</div><div>DWG. NO.</div><div>REV</div><div>C</div><div>TE-22100</div><div>SCALE: 1:12</div><div>SHEET 3 OF 7</div></div>		
	DRAWN	KAMC	1/4/2022			
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Step 4





1. Add remaining Step 1 assembly to Step 3, as shown. Ensure the plywood from (1) sits on top of the 4"x4" lumber of (7) .  
Note: Attachment between (7) and (1) will occur in a later step.
2. Connect (7) to (4) using 2x (14) , 4x (11) , and 2x (12) . Ensure connection is tight.
3. Tighten hardware installed in Step 2.

Step 5



1. Align 4x (10) to (9) , as shown.  
Note: If you opted to match drill some/all holes on TE-22194, they should be drilled out now.
2. Connect using 3x (15) , 3x (11) , and 3x (12) per (10) .
3. If needed, tighten hardware on (10) .

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	DRAWN	KAMC	1/4/2022		
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	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.				SIZE C
		DWG. NO. TE-22100		REV	
		SCALE: 1:12		SHEET 4 OF 7	



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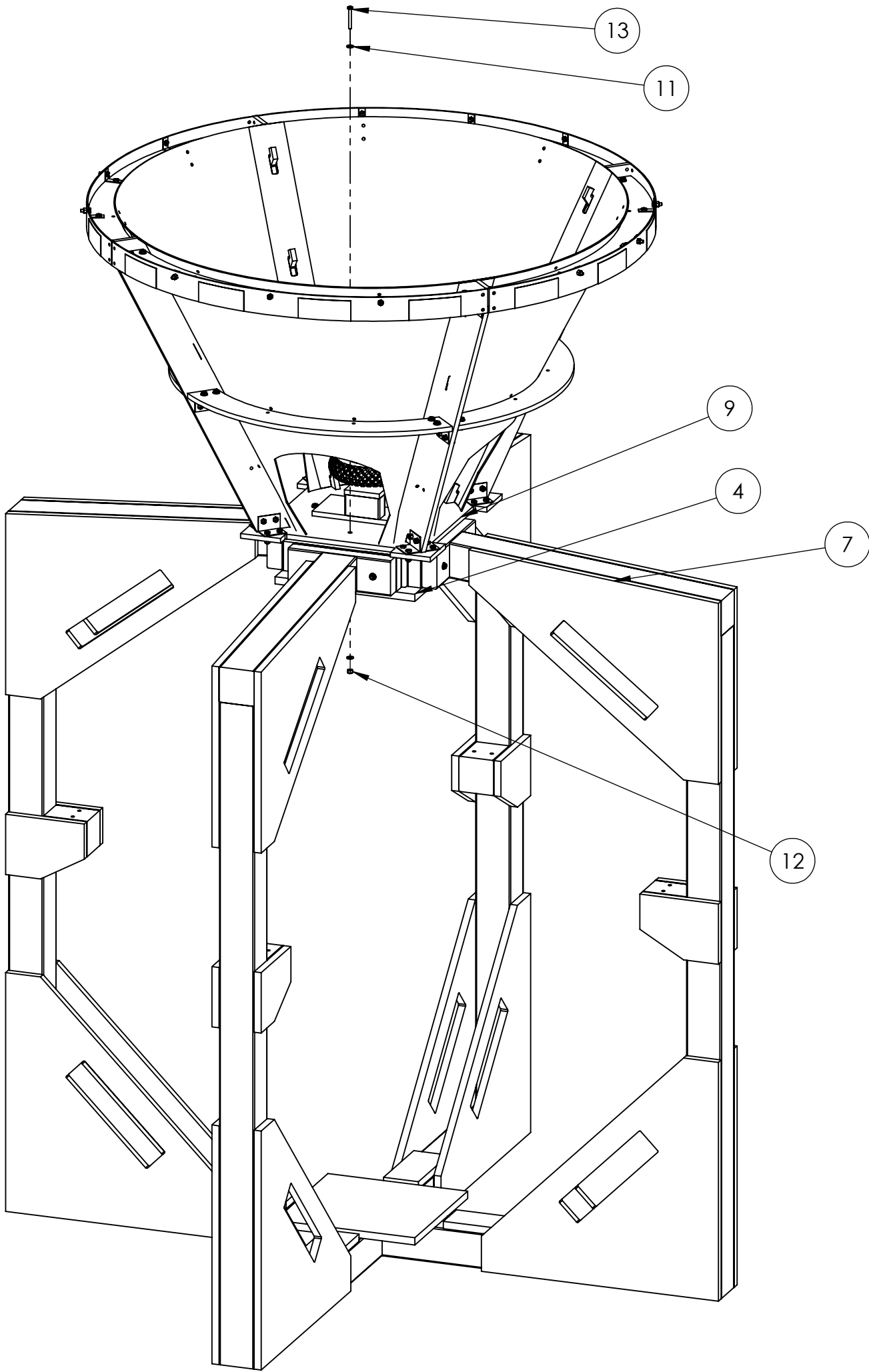
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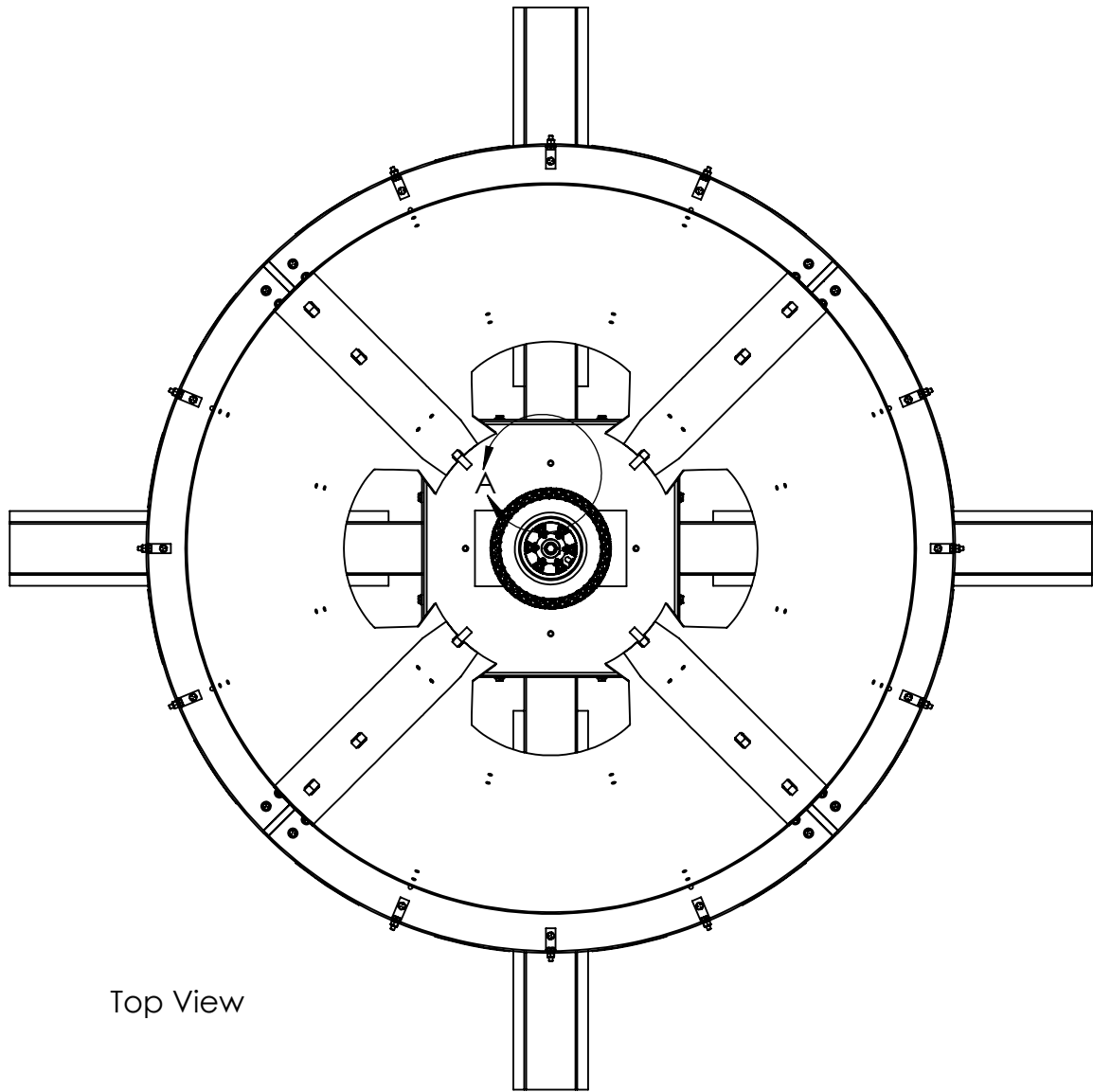
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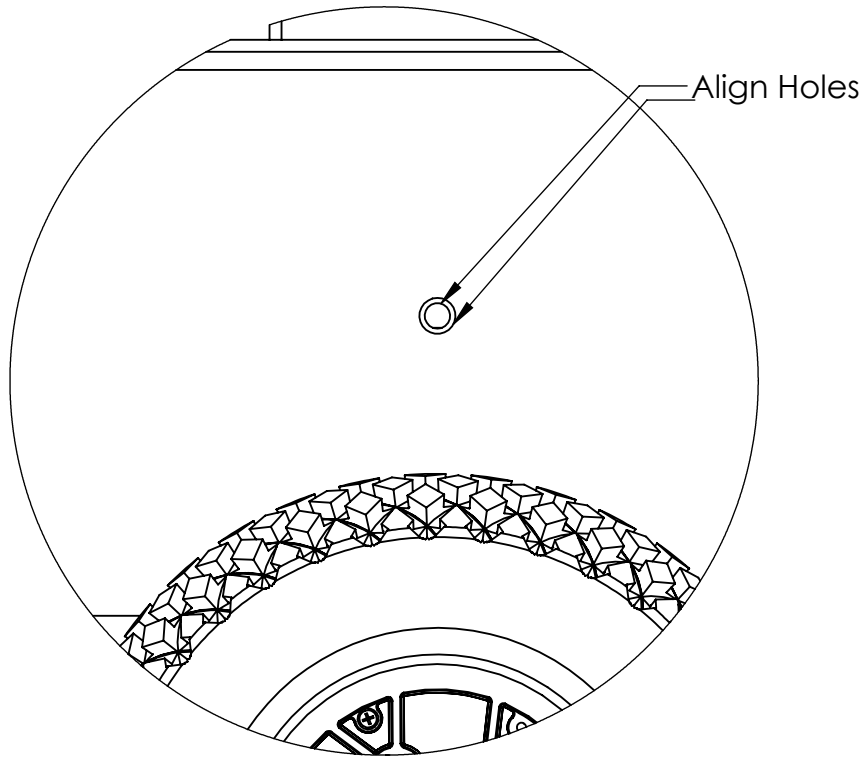
Step 6



1. Align Step 5 atop Step 4 , as shown.  
Note: Ensure there are multiple people to lift Step 5 into place. Consider resting Step 5 atop 7 , if needed. If using TE-22190-AMActive, be mindful of the motor protruding from the bottom of the assembly.
2. Connect 9 to 4 using 4x 13 , 8x 11 , and 4x 12 .



Top View



DETAIL A  
SCALE 1 : 2

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MATERIAL/FINISH:		PROPRIETARY AND CONFIDENTIAL		
DO NOT SCALE DRAWING		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FIRST®. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FIRST® IS PROHIBITED.		
		COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.		
		TITLE: HUB - Complex Build - Full Hub Assembly		
		SIZE	DWG. NO.	REV
		C	TE-22100	
		SCALE: 1:12		SHEET 5 OF 7



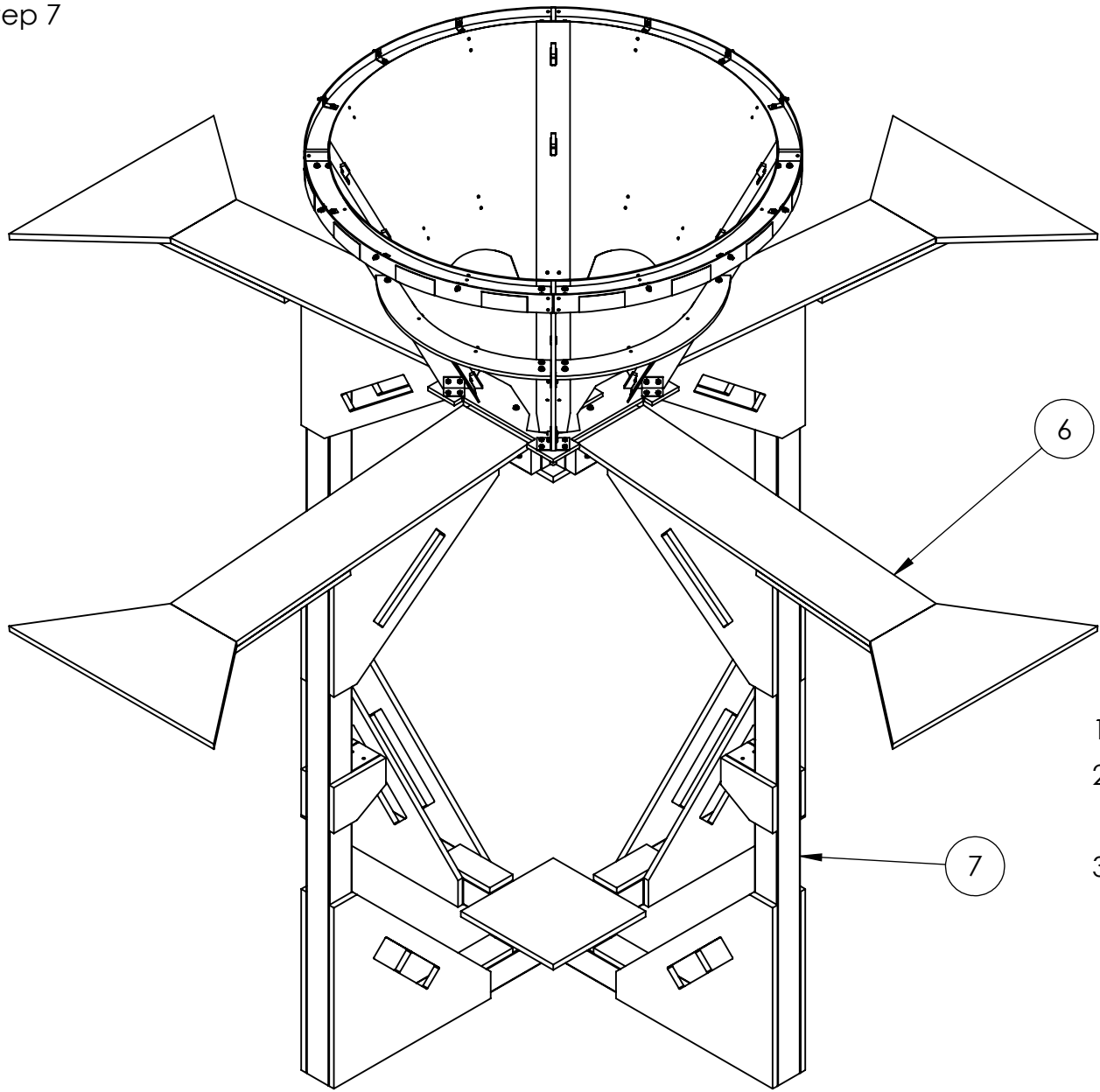
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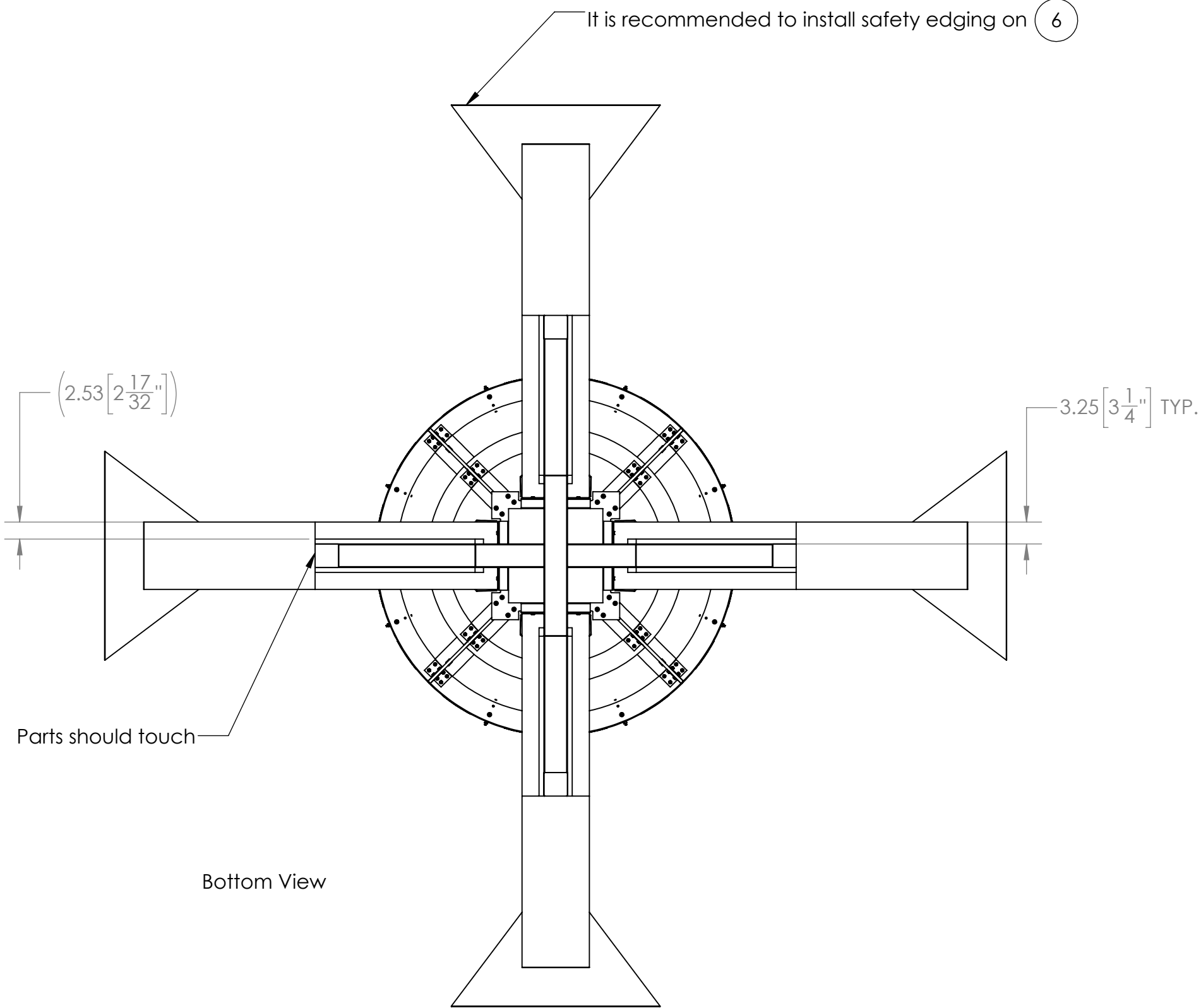
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Step 7



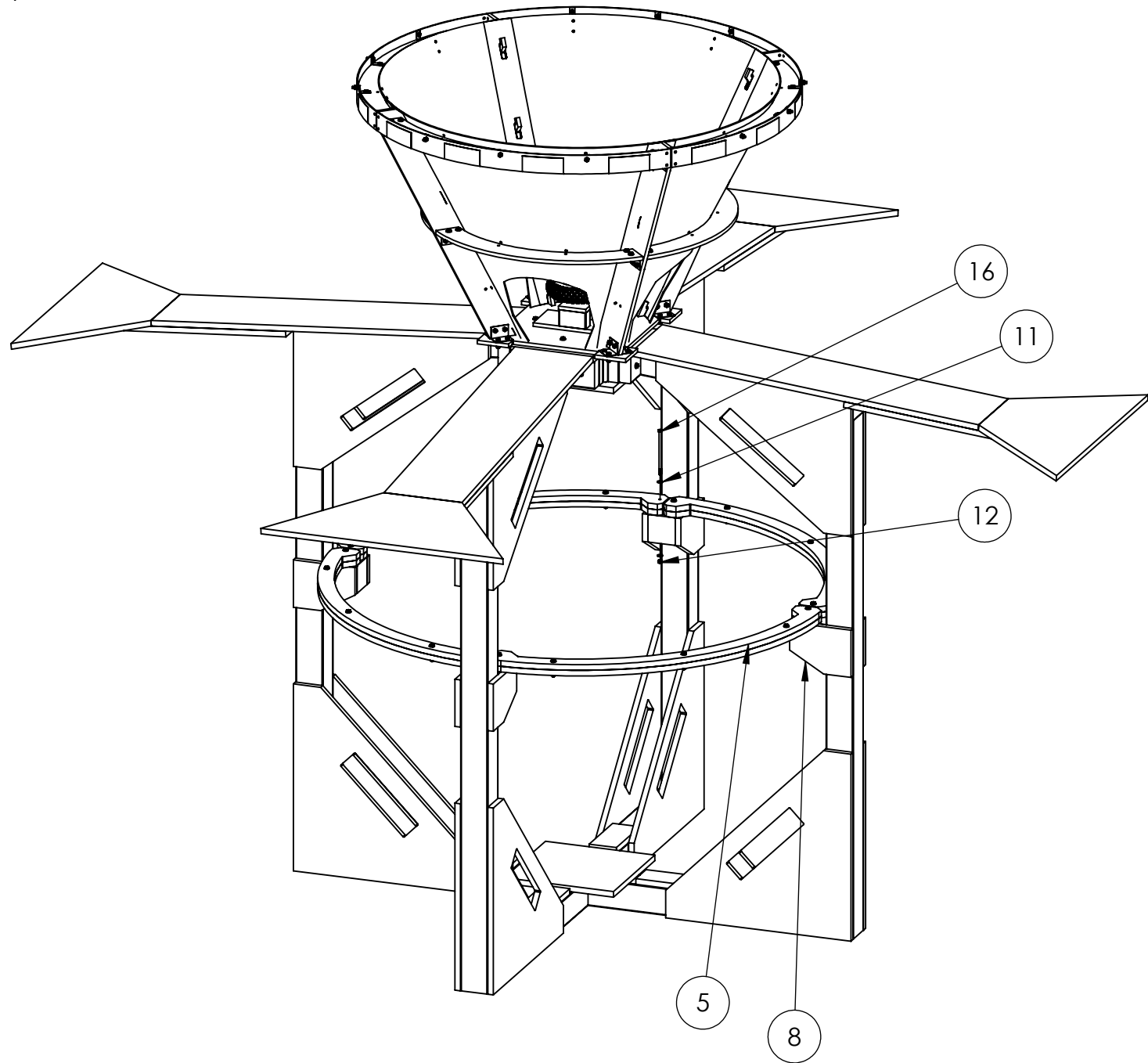
1. Align 4x 6 to Step 6, as shown.
2. Connect using 2" long screws. It is recommended to use 8x screws per 6.
3. Optional: It is recommended to install safety edging on 6 at this time. Safety edging could be pool noodles, baby proofing material, etc.

It is recommended to install safety edging on 6





Bottom View

Step 8

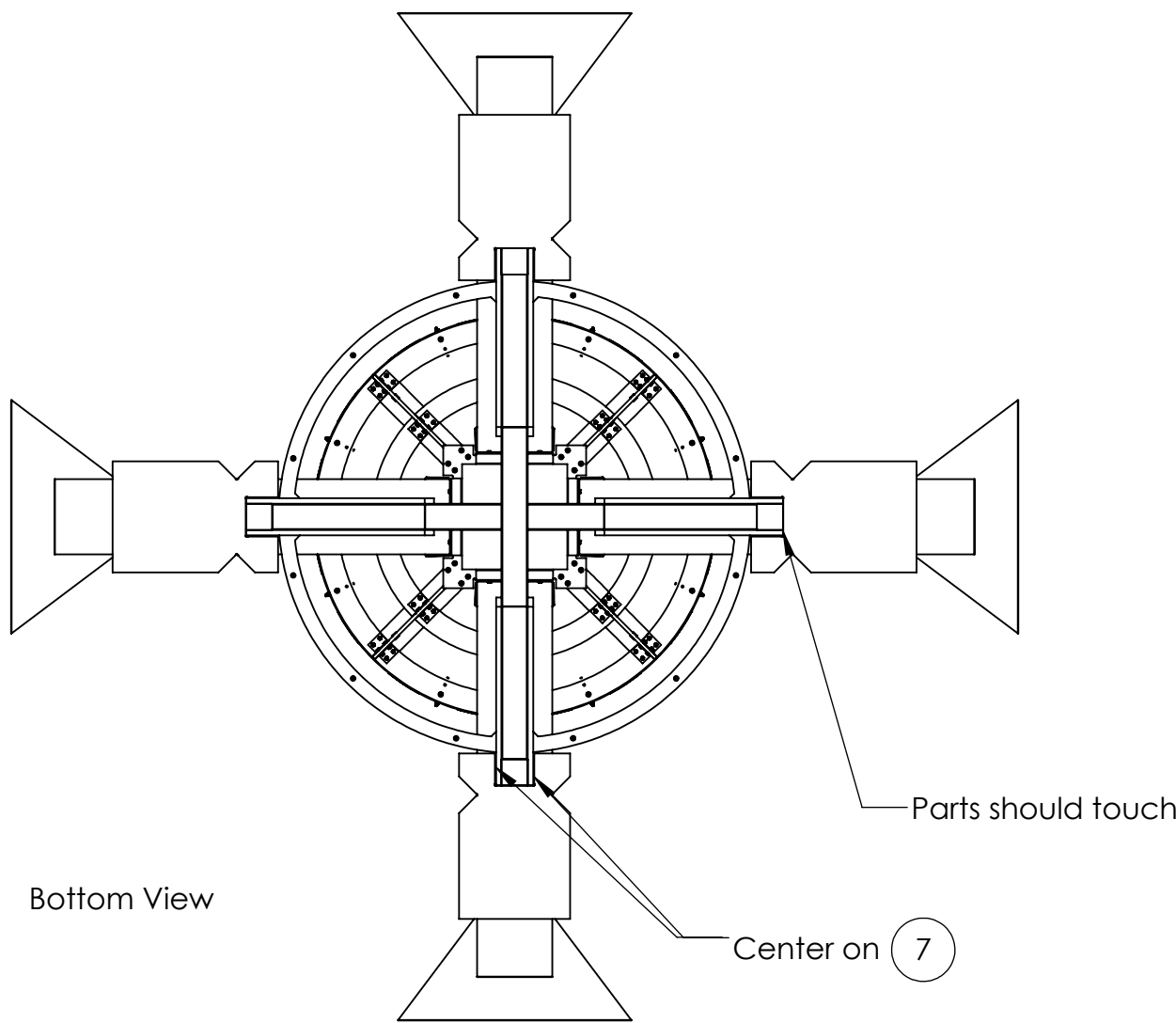
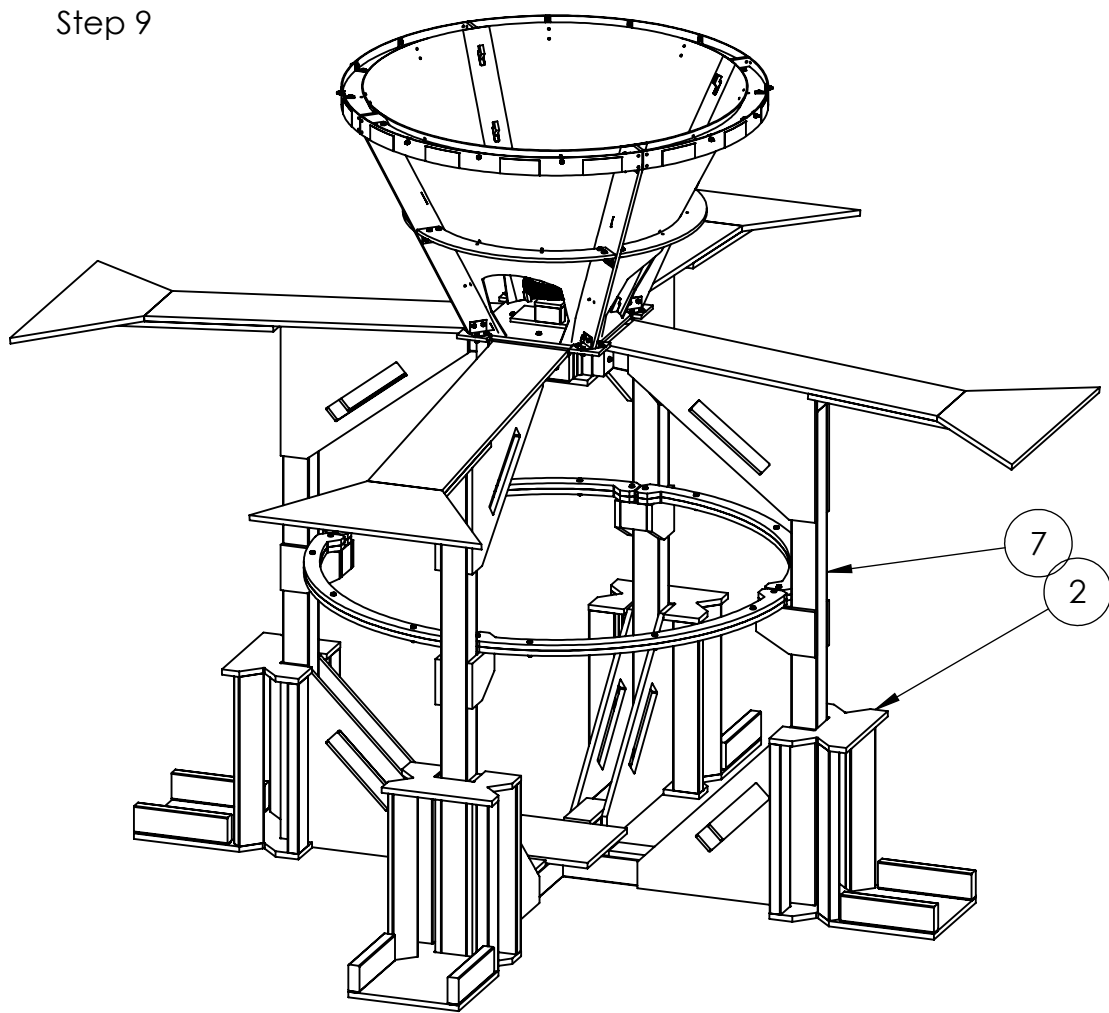


1. Align 4x 5 atop 8 (installed in Step 1 assemblies), as shown.
2. Loosely connect 5 to 8 using 2x 16, 4x 11, and 2x 12 per 8.

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	DRAWN	KAMC	1/4/2022		
	PROPRIETARY AND CONFIDENTIAL  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FIRST®. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FIRST® IS PROHIBITED.				TITLE: HUB - Complex Build - Full Hub Assembly
	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.				SIZE C
		DWG. NO.		REV	
		TE-22100			
		SCALE: 1:18		SHEET 6 OF 7	

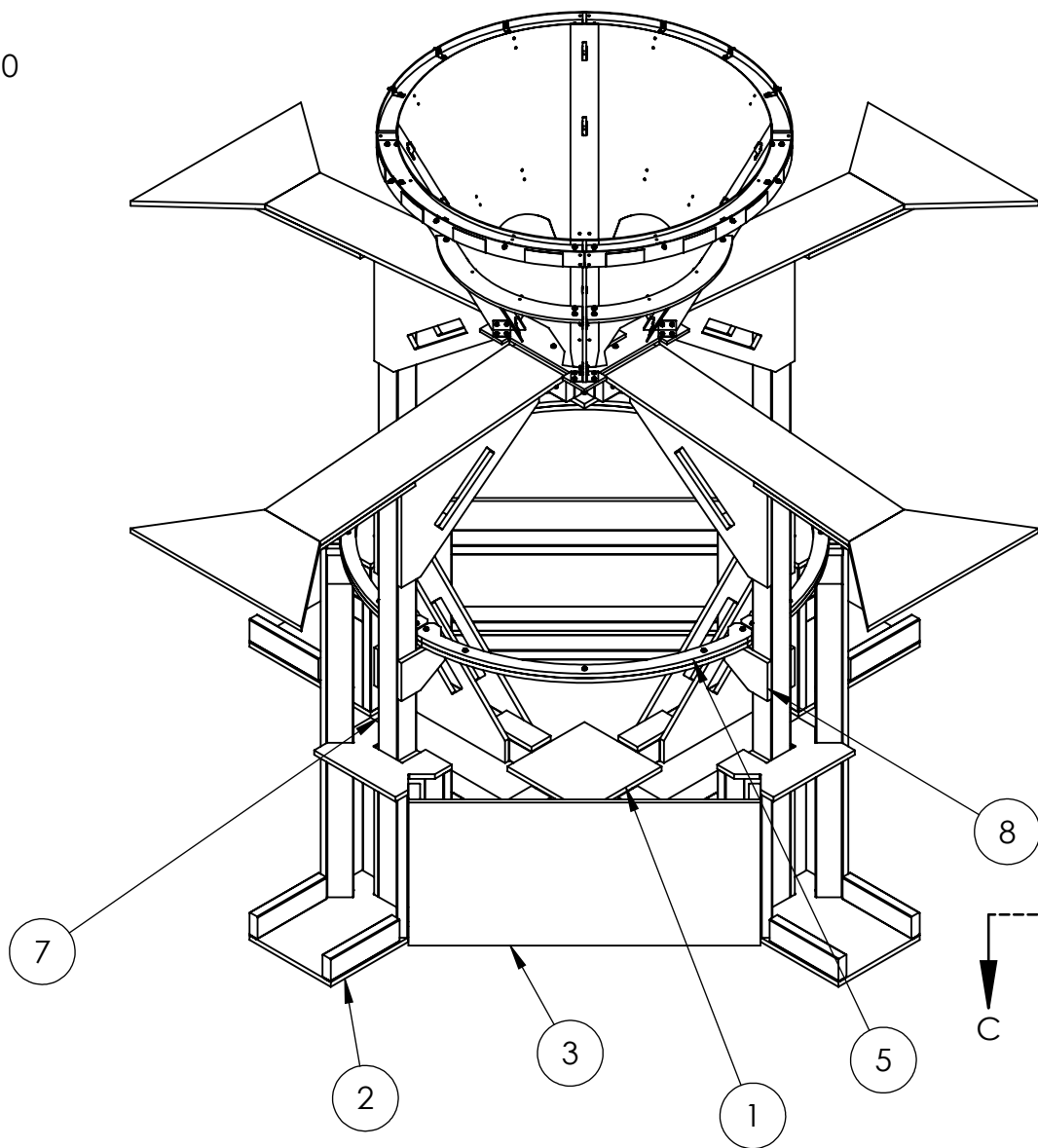


Step 9

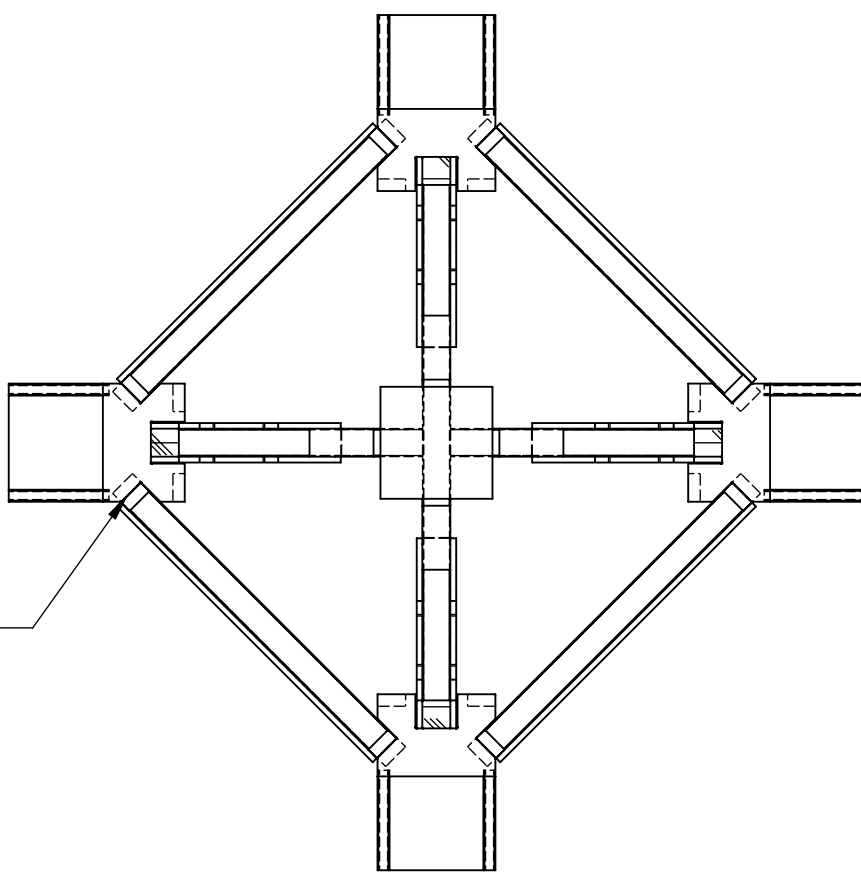
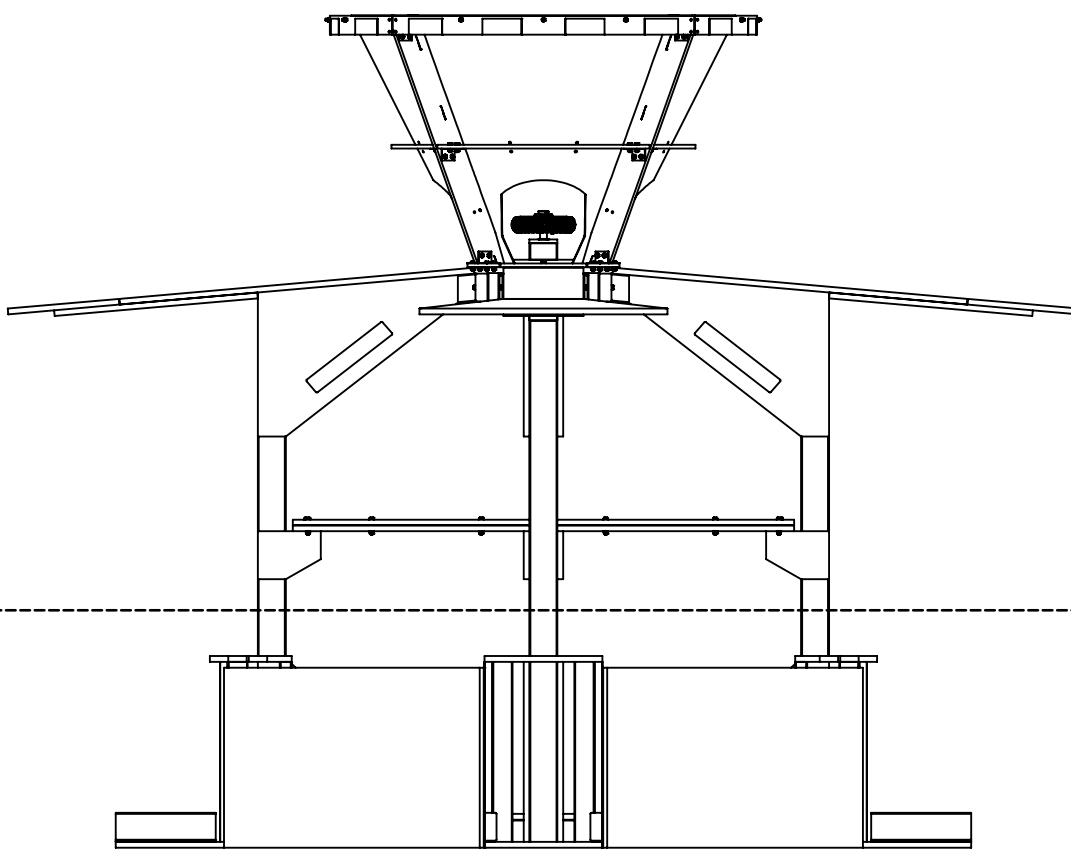


1. Align 4x 2 to Step 8, as shown.  
Connection will happen in a later step.

Step 10





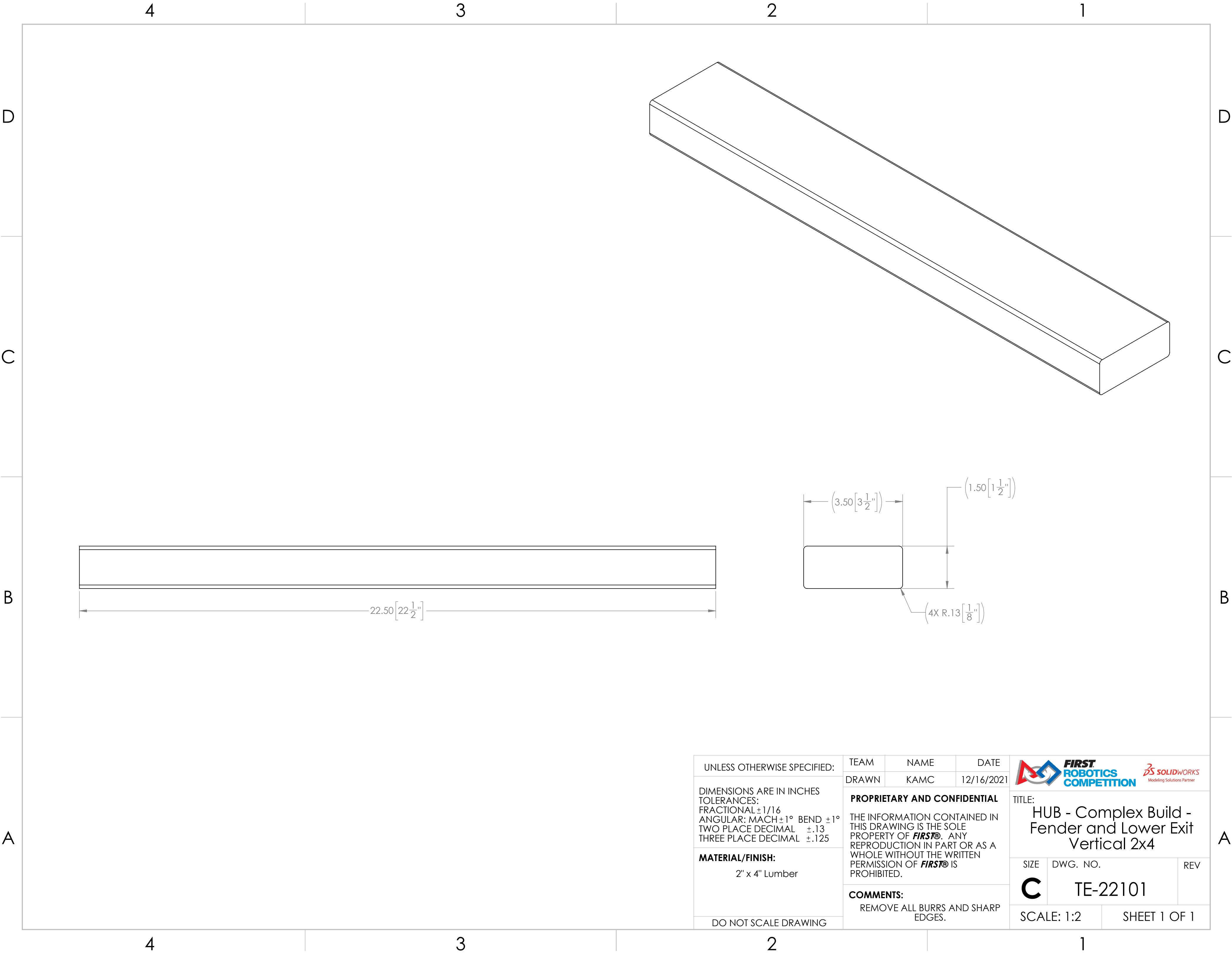
1. Add 4x 3 to Step 9, as shown.  
2. Connect 3 to 2 using 2.5" long screws. It is recommended to use 8x screws per 3, 4x per side.  
3. Tighten hardware between 4x 5 and 4x 8.  
4. Optional: Add 2" long screws to connect 1 to 4x 7. It is recommended to 4x screws per 7.  
Note: It is a best practice to avoid placing screws within 1" of the cut edge of 4"x4" lumber.





Parts should touch

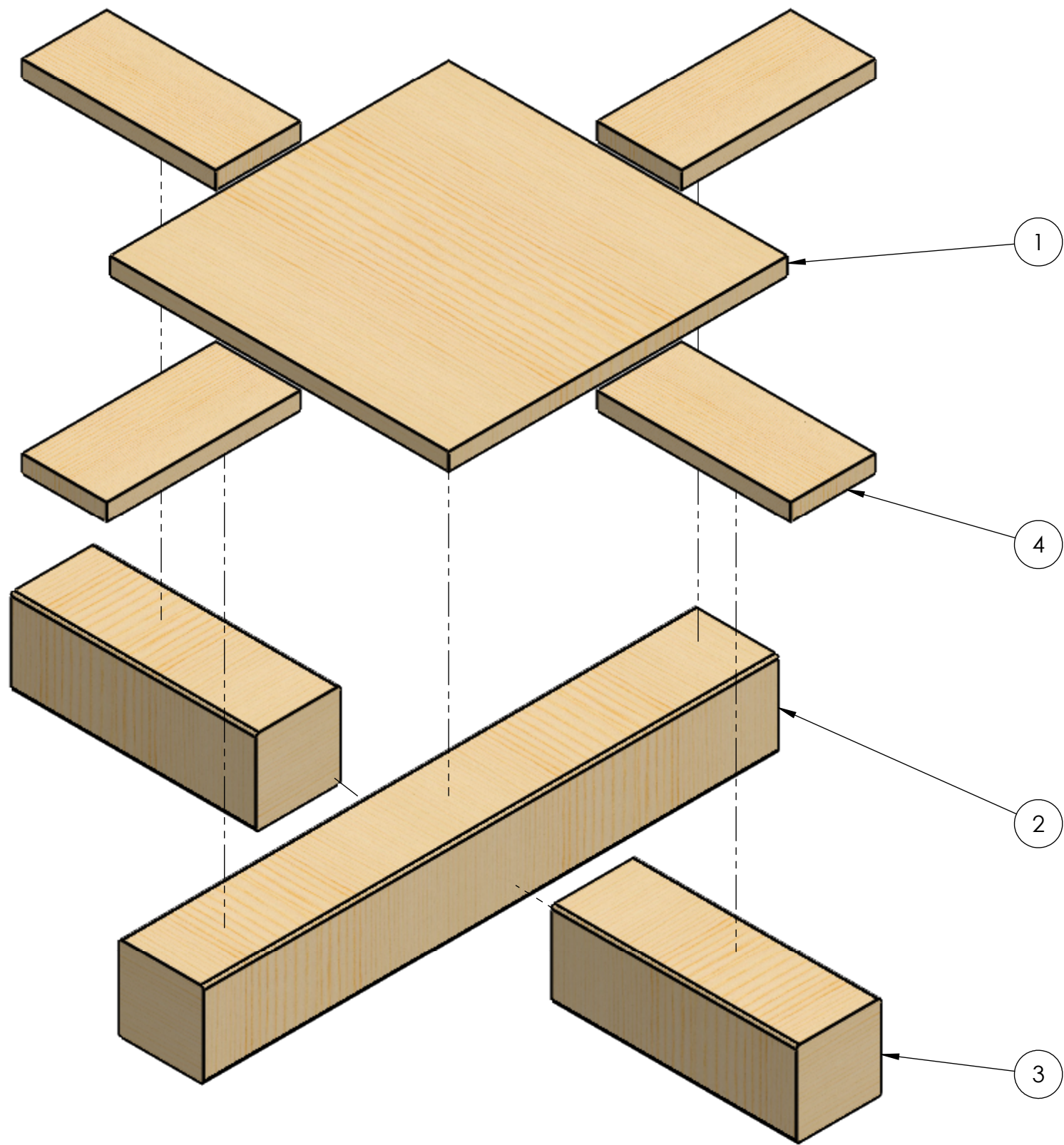
SECTION C-C  
Hidden Lines Shown

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	SIZE	DWG. NO.	REV										
	C	TE-22100											
	SCALE: 1:24		SHEET 7 OF 7										
DRAWN	KAMC	1/4/2022											
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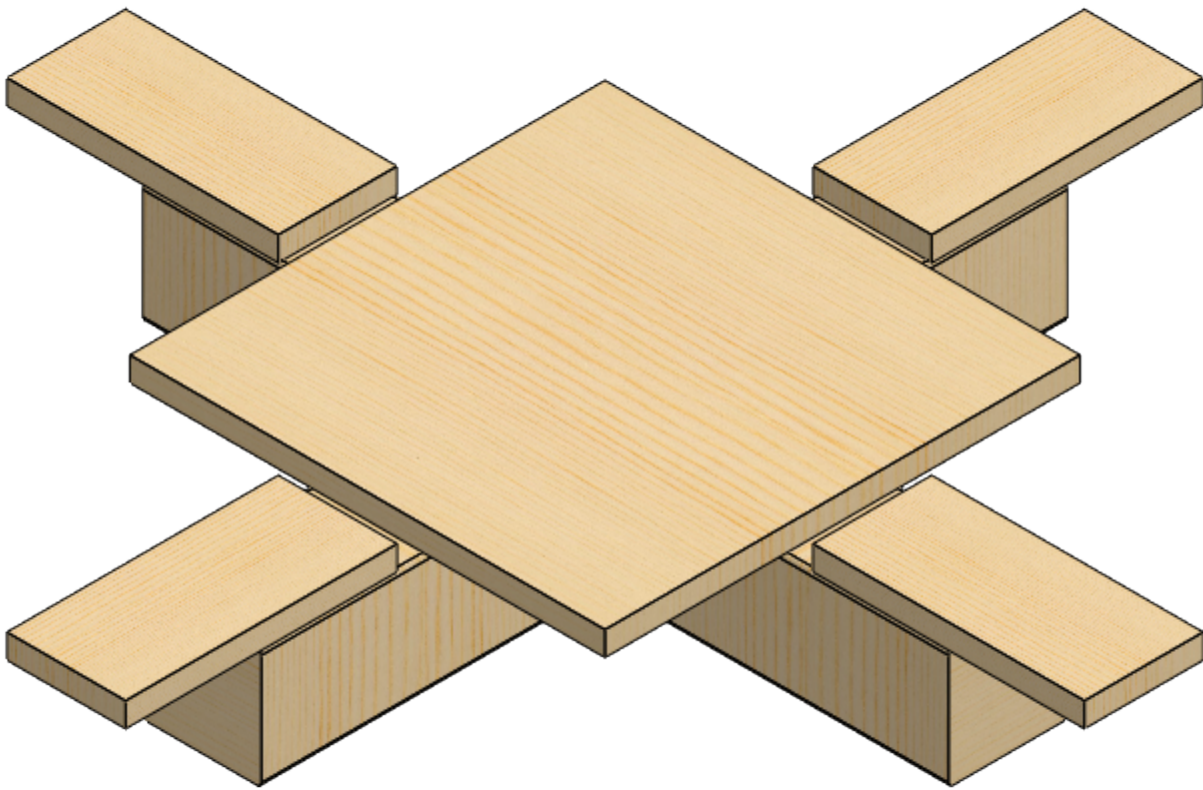


UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  2" x 4" Lumber   DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/16/2021			
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				SIZE	DWG. NO.	REV
				C	TE-22101	
				SCALE: 1:2		SHEET 1 OF 1







Exploded View

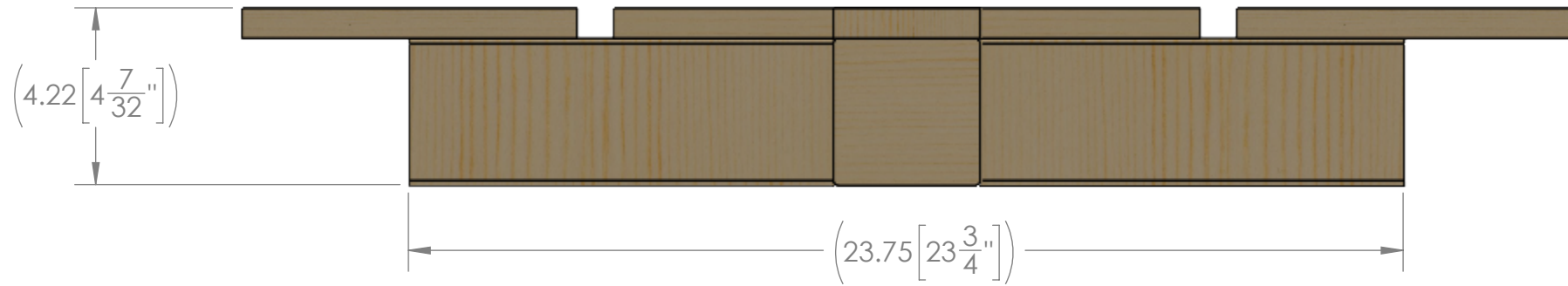
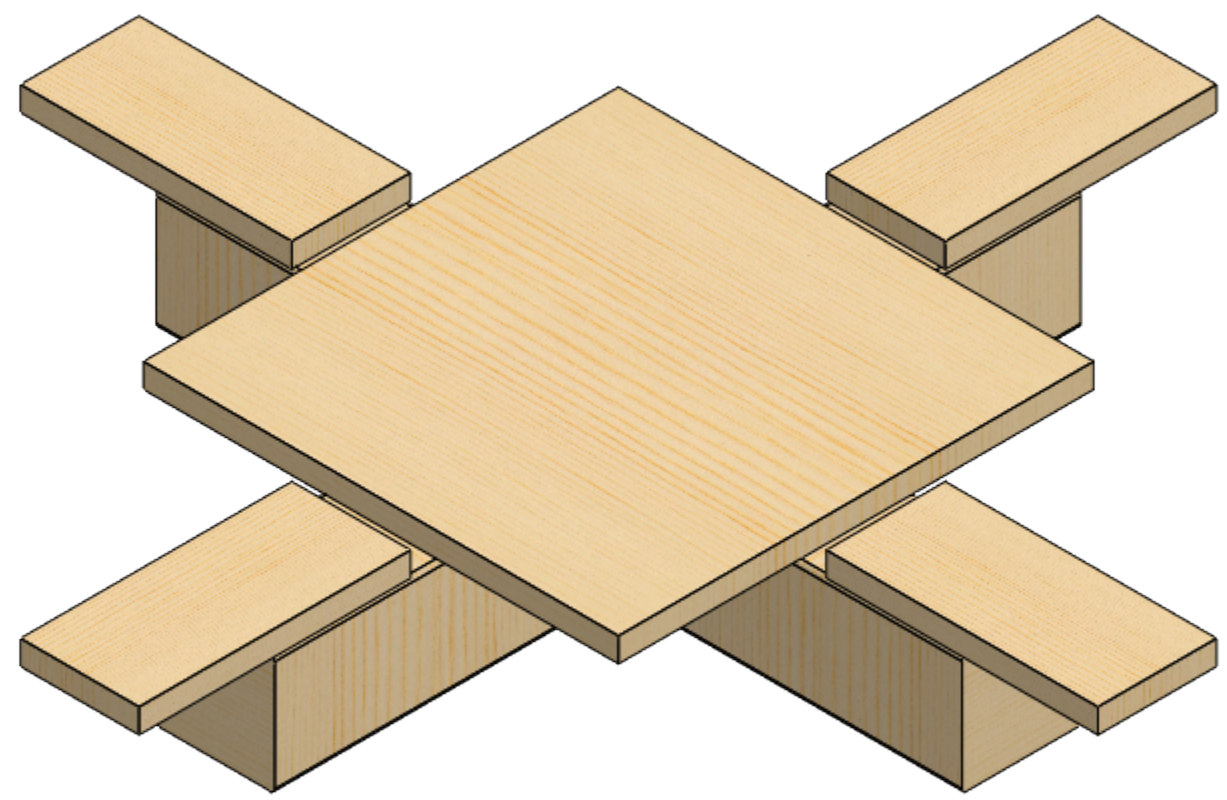
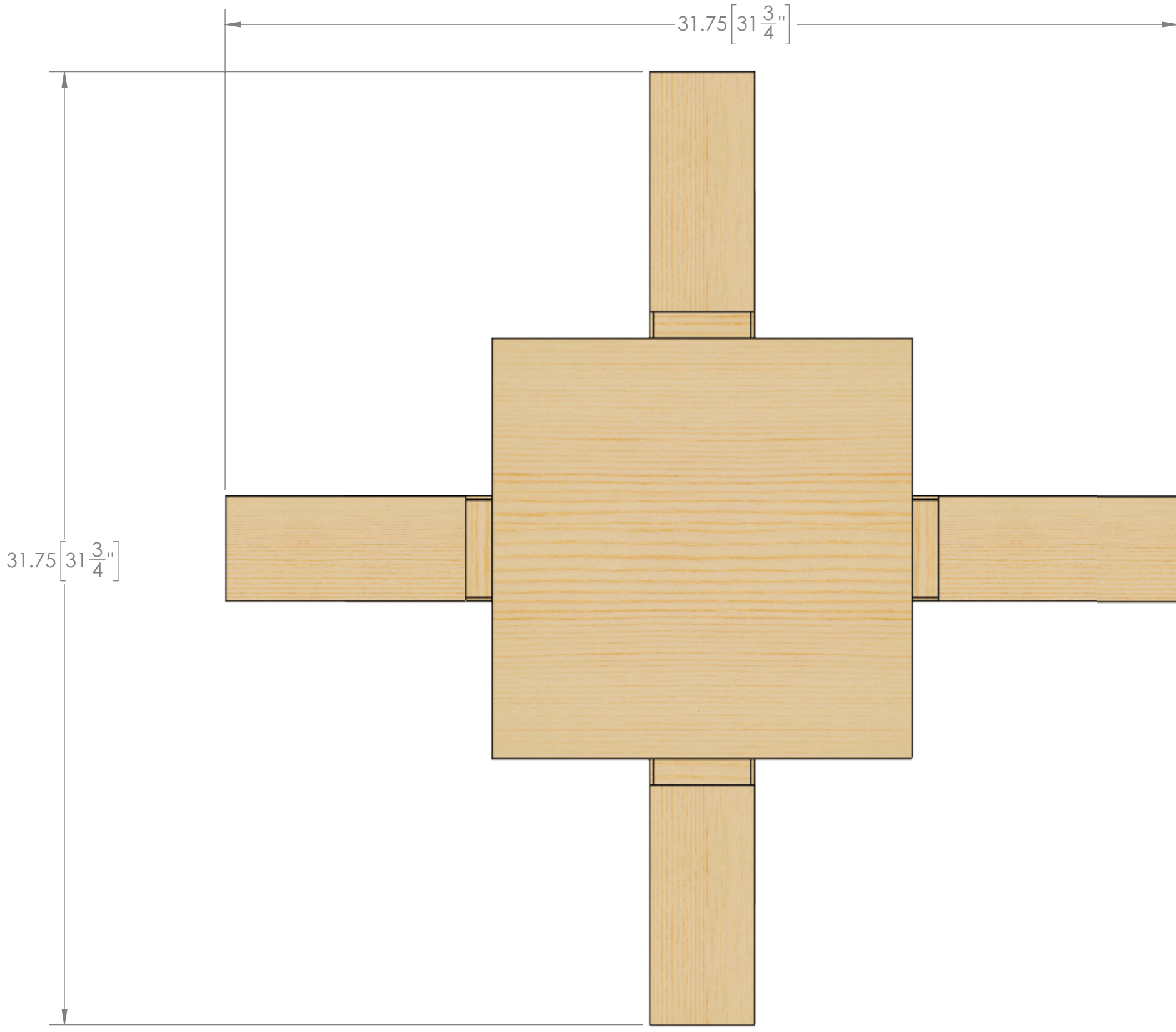




Hardware Needed:  
#8 x 2.5" Long Screw - Qty 32

ITEM NO.	PART NUMBER	DESCRIPTION	
1	TE-22111	Hub - Complex Build - Center Base Plate	1
2	TE-22112	HUB - Complex Build - Base Long 4x4	1
3	TE-22113	HUB - Complex Build - Base Short 4x4	2
4	TE-22114	HUB - Complex Build - Base to Leg Connection Plate	4

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	DRAWN	KAMC	12/16/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	PROPRIETARY AND CONFIDENTIAL			TITLE: HUB - Complex Build - Base Assembly		
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MATERIAL/FINISH:	COMMENTS:			SIZE	DWG. NO.	REV
	REMOVE ALL BURRS AND SHARP EDGES.			C	TE-22110	
DO NOT SCALE DRAWING				SCALE: 1:4		SHEET 2 OF 3



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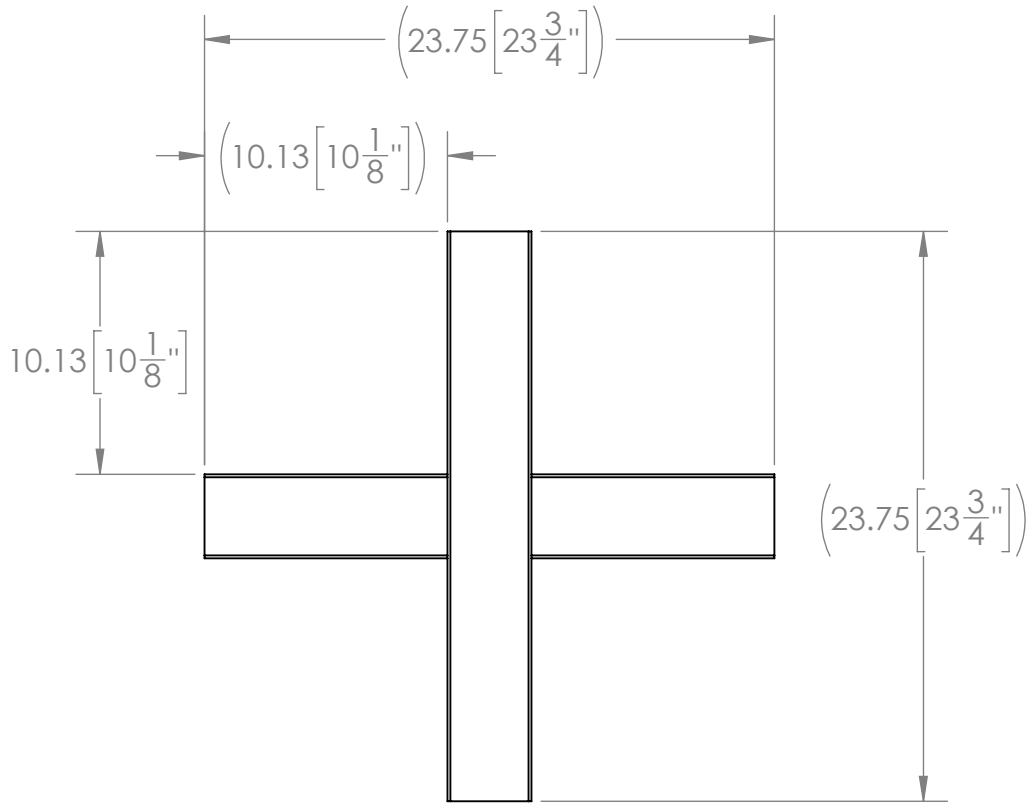
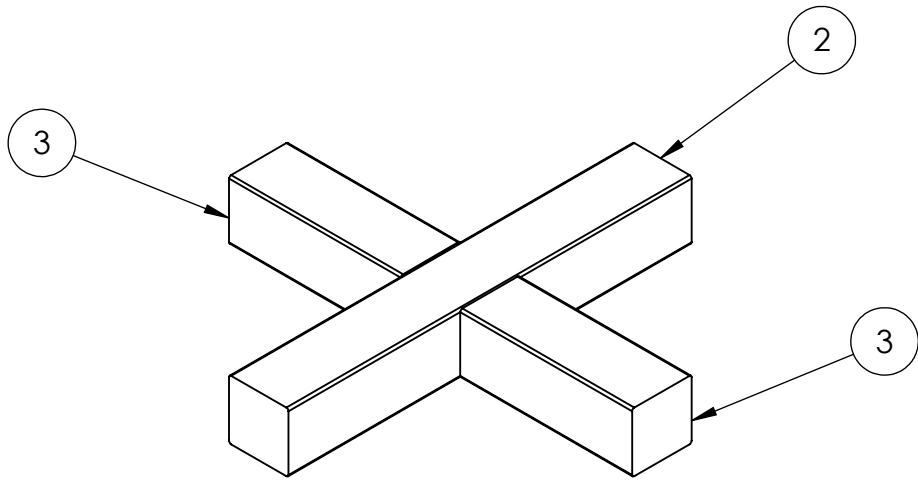
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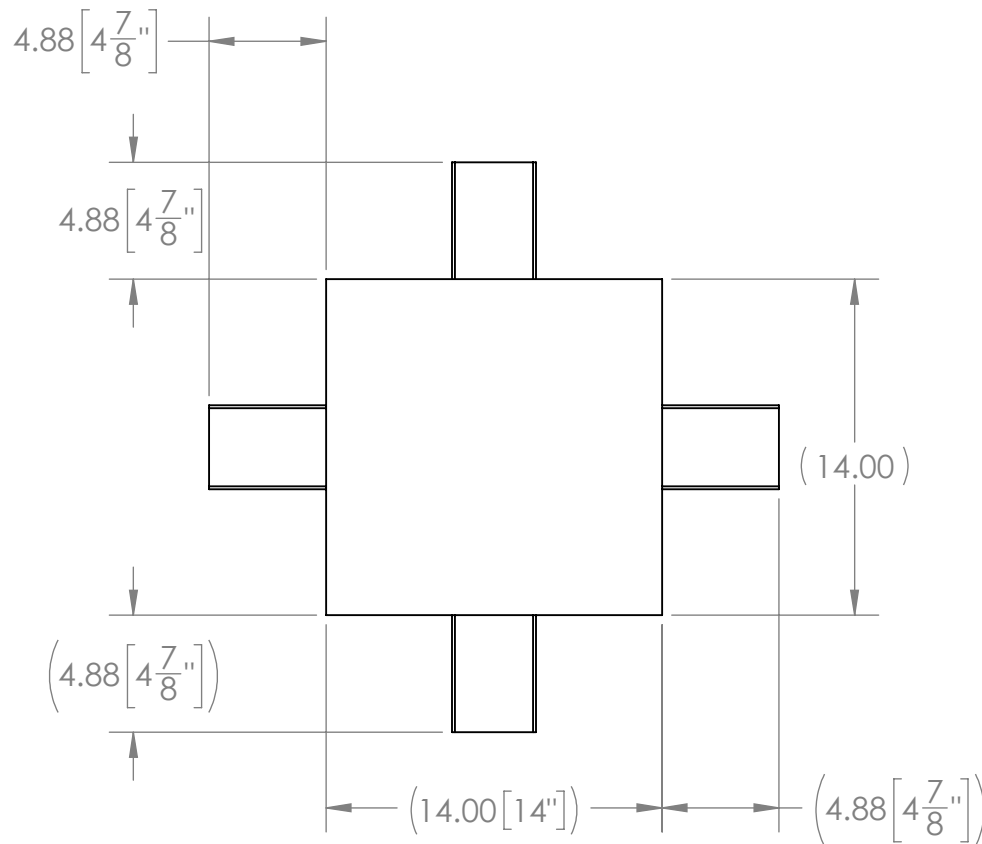
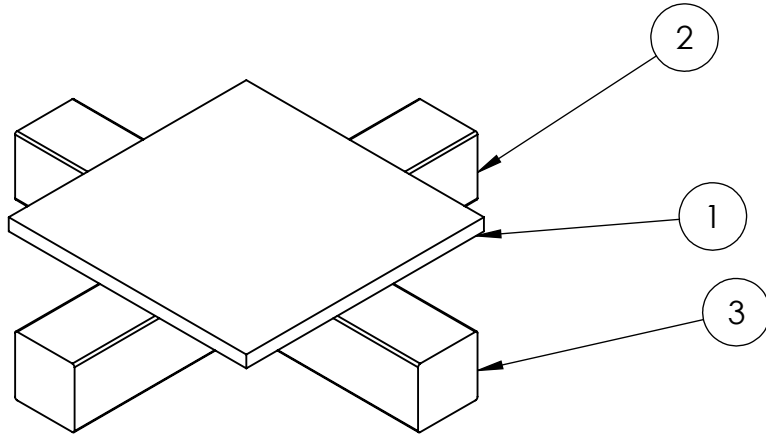
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Step 1



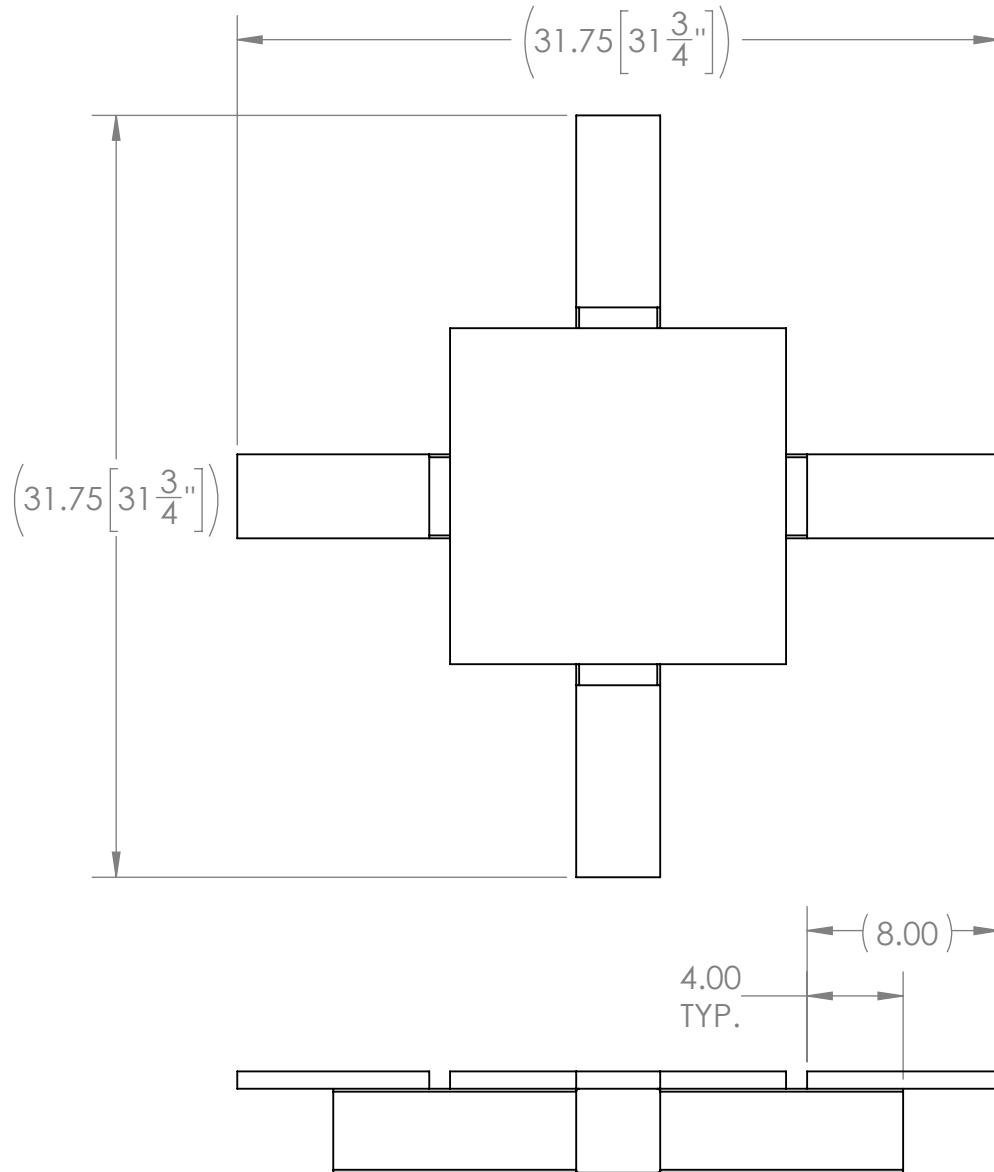
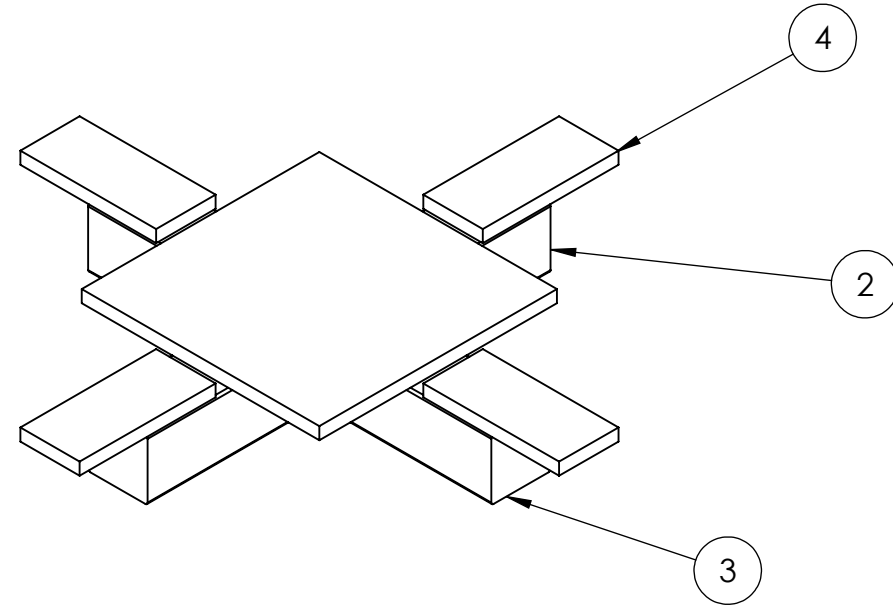
1. Align 2x (3) to (1) as shown. Attachment will happen in next step.

Step 2



1. Align (1) to Step 1, as shown.  
2. Connect using 2.5\" long screws. It is recommended to use 4x screws into each (3) and 8x (2).  
Note: A best practice when screwing into a 4\"x4\" is to avoid placing a screw within 1\" from the cut edge.

Step 3



1. Align a total of 4x (4) such that x2 are on (2) and x1 is on each (3), as shown.  
2. Connect using 2.5\" long screws. It is recommended to use 4x screws per (4).

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM

DRAWN

NAME

KAMC

DATE

12/16/2021

PROPRIETARY AND CONFIDENTIAL

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COMMENTS:

REMOVE ALL BURRS AND SHARP EDGES.



**FIRST**  
ROBOTICS  
COMPETITION

**SOLIDWORKS**  
Modeling Solutions Partner

TITLE:

HUB - Complex Build -  
Base Assembly

SIZE

**C**

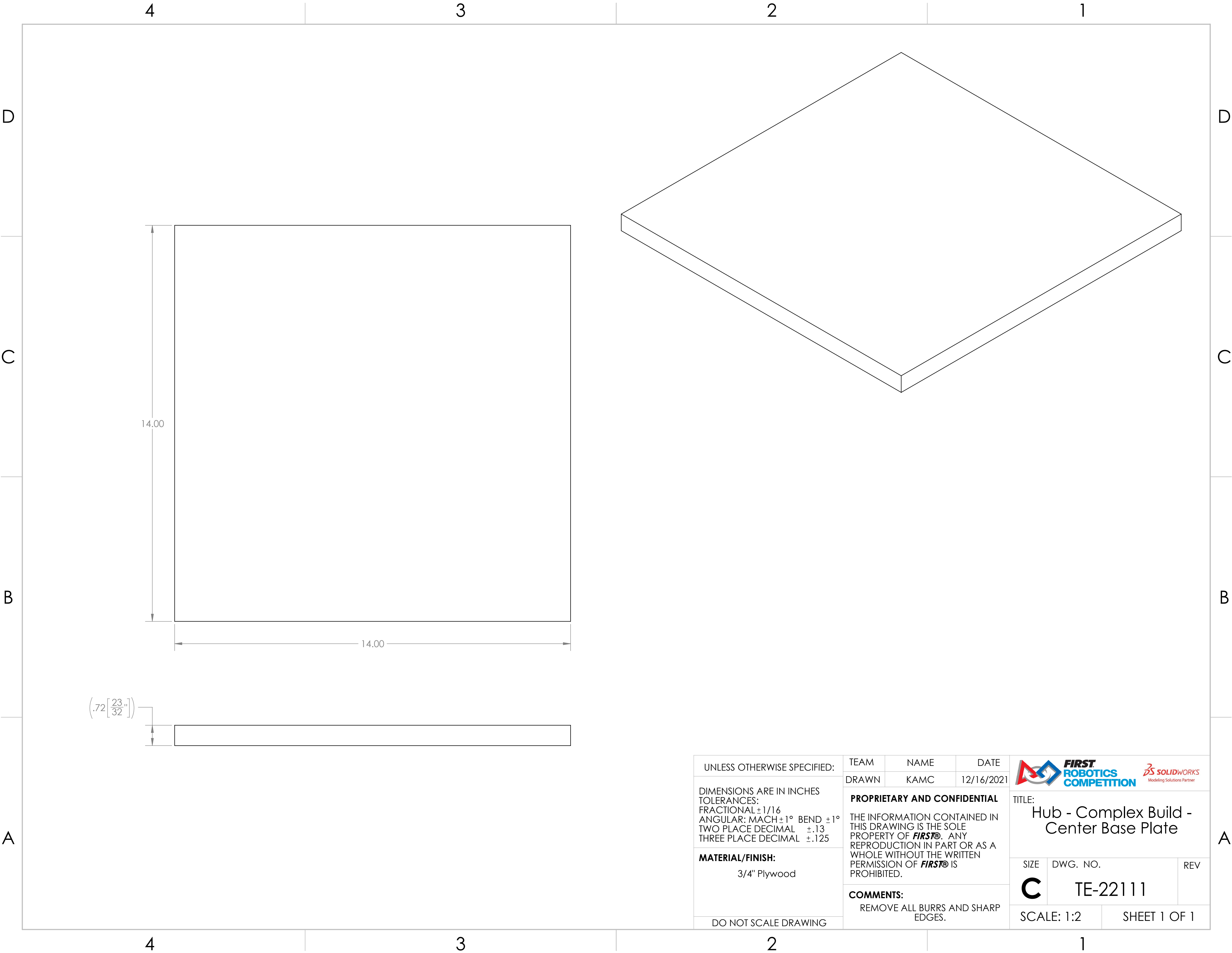
DWG. NO.



TE-22110

REV

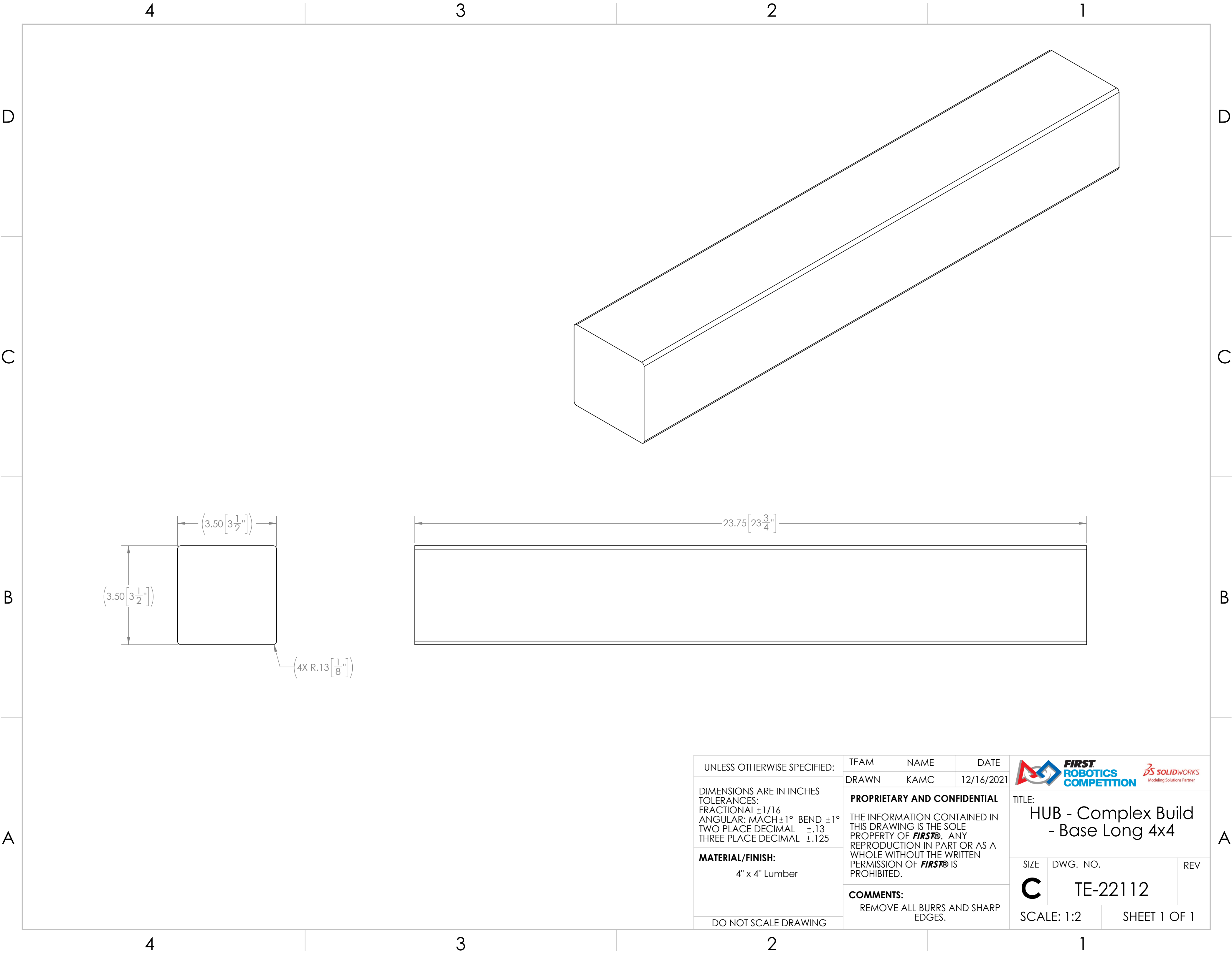
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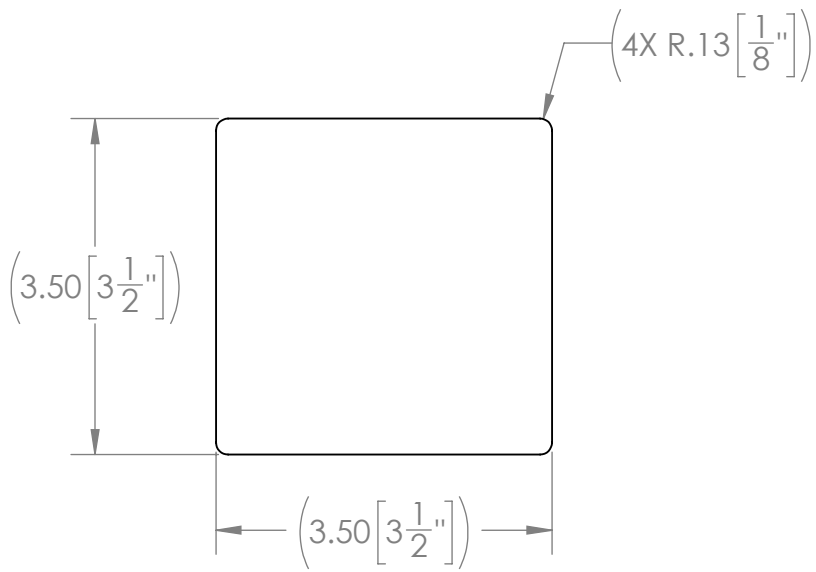
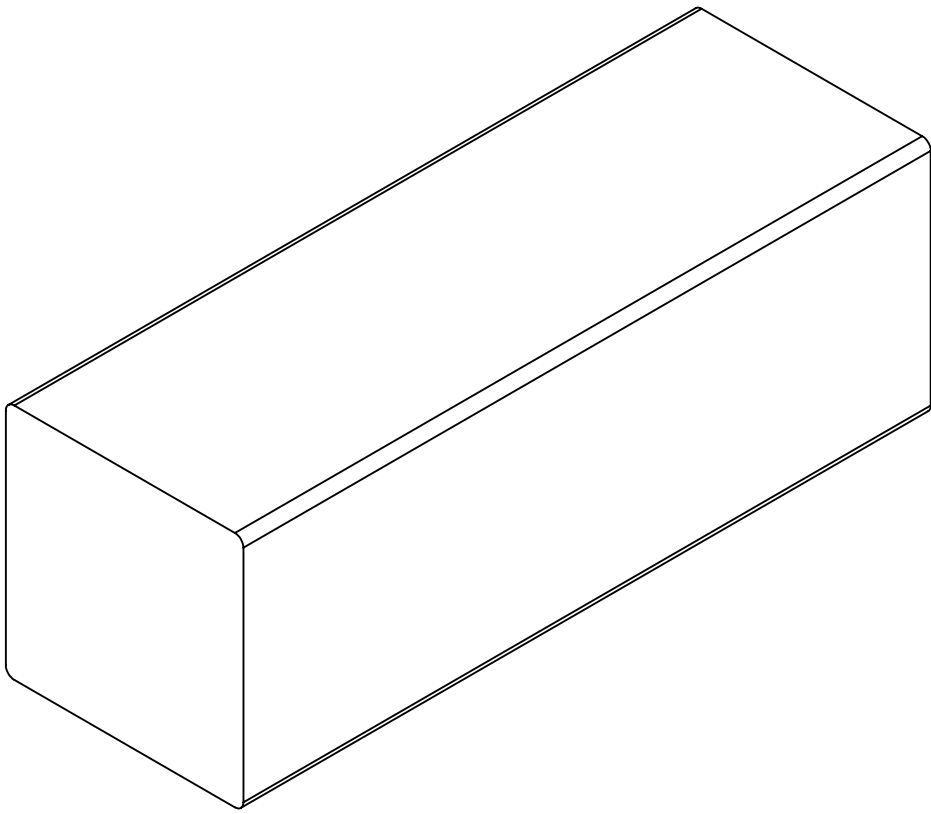
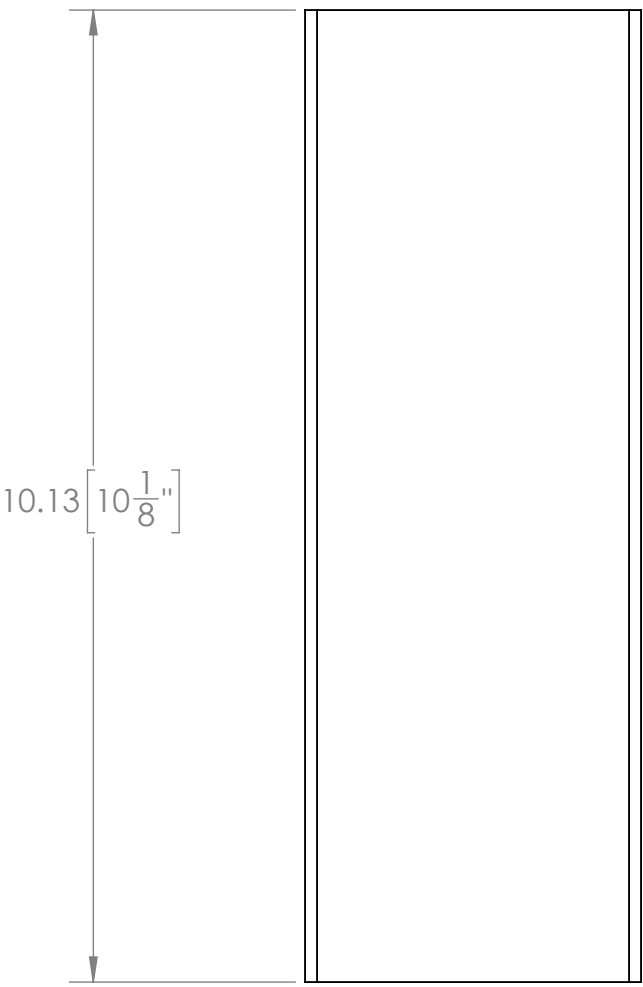
SHEET 3 OF 3





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	DRAWN	KAMC	12/16/2021			
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SCALE: 1:2		SHEET 1 OF 1				

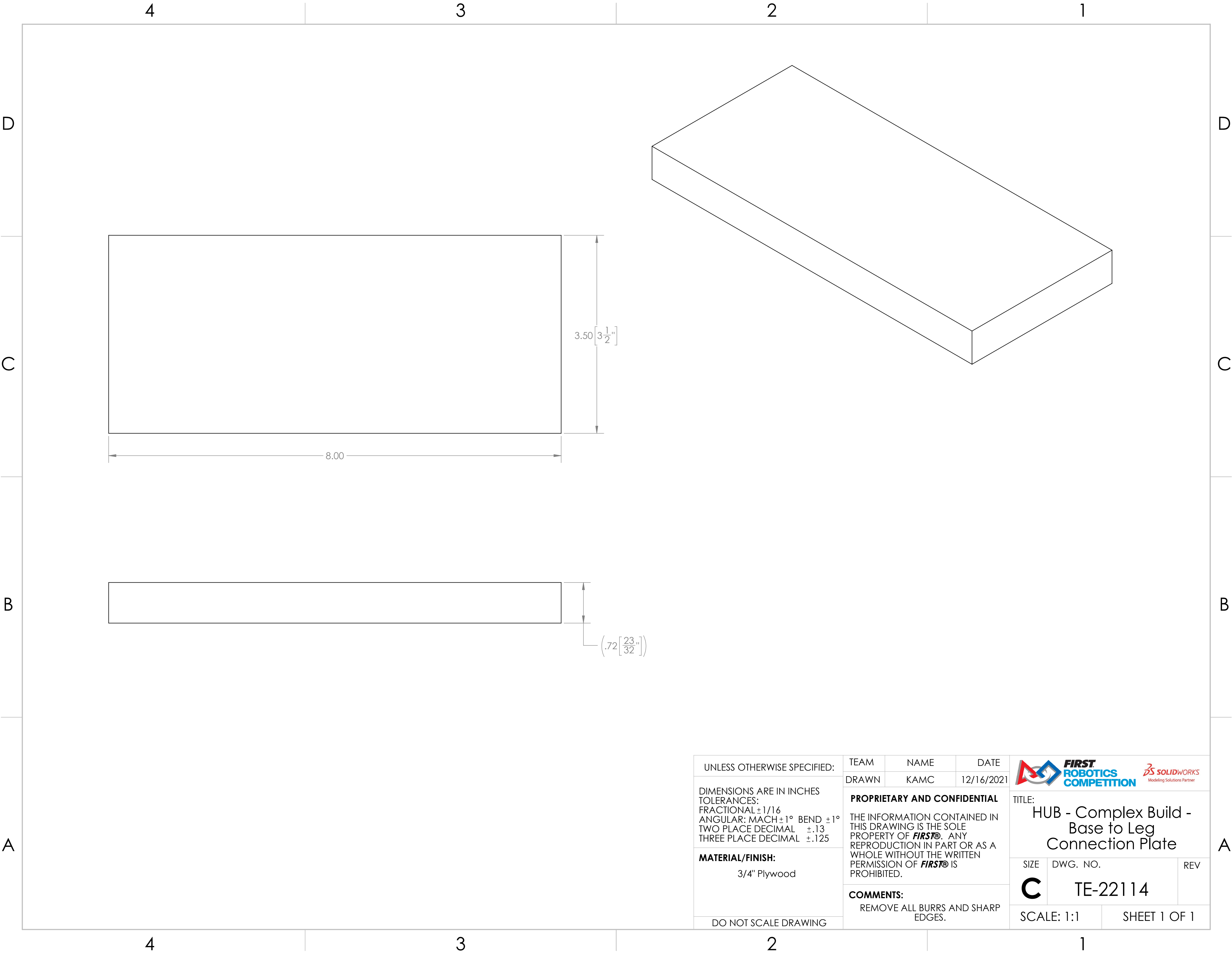








UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  4" x 4" Lumber  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div><div></div><div>TITLE: HUB - Complex Build - Base Short 4x4</div></div>		
	DRAWN	KAMC	12/16/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
C				TE-22113		
SCALE: 1:2				SHEET 1 OF 1		





UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>  3/4" Plywood  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/16/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE: HUB - Complex Build - Base to Leg Connection Plate		
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE <b>C</b>	DWG. NO. TE-22114	REV
SCALE: 1:1		SHEET 1 OF 1				

4

3

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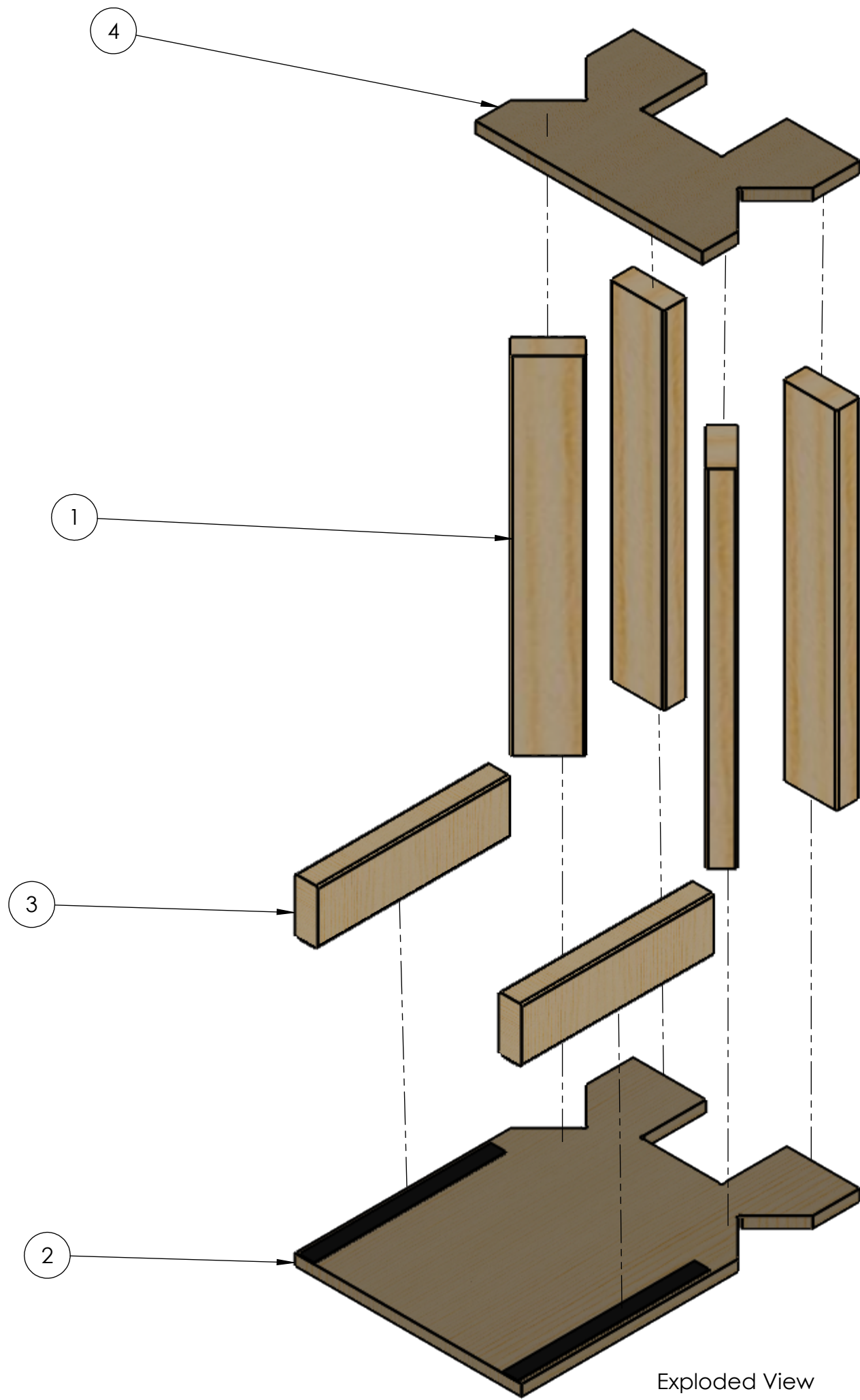
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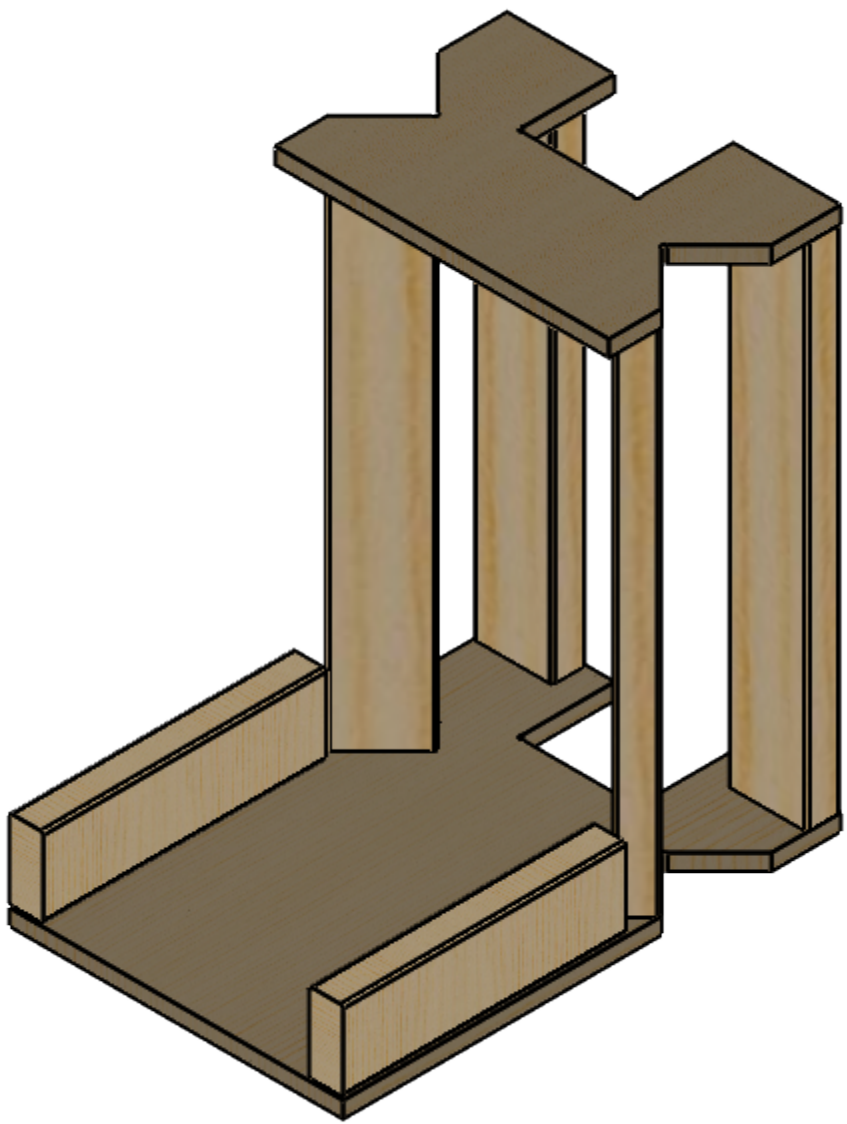
B

A

A





Exploded View

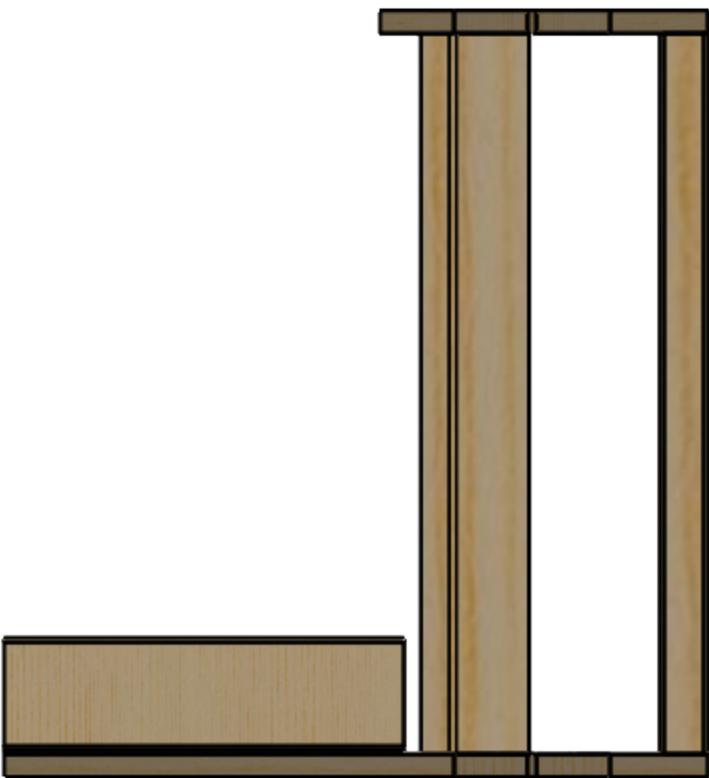
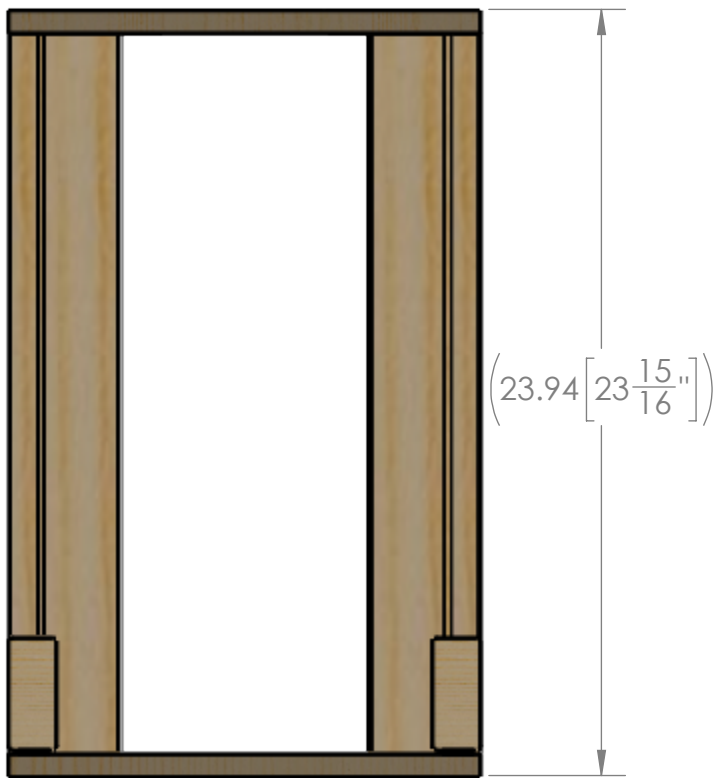
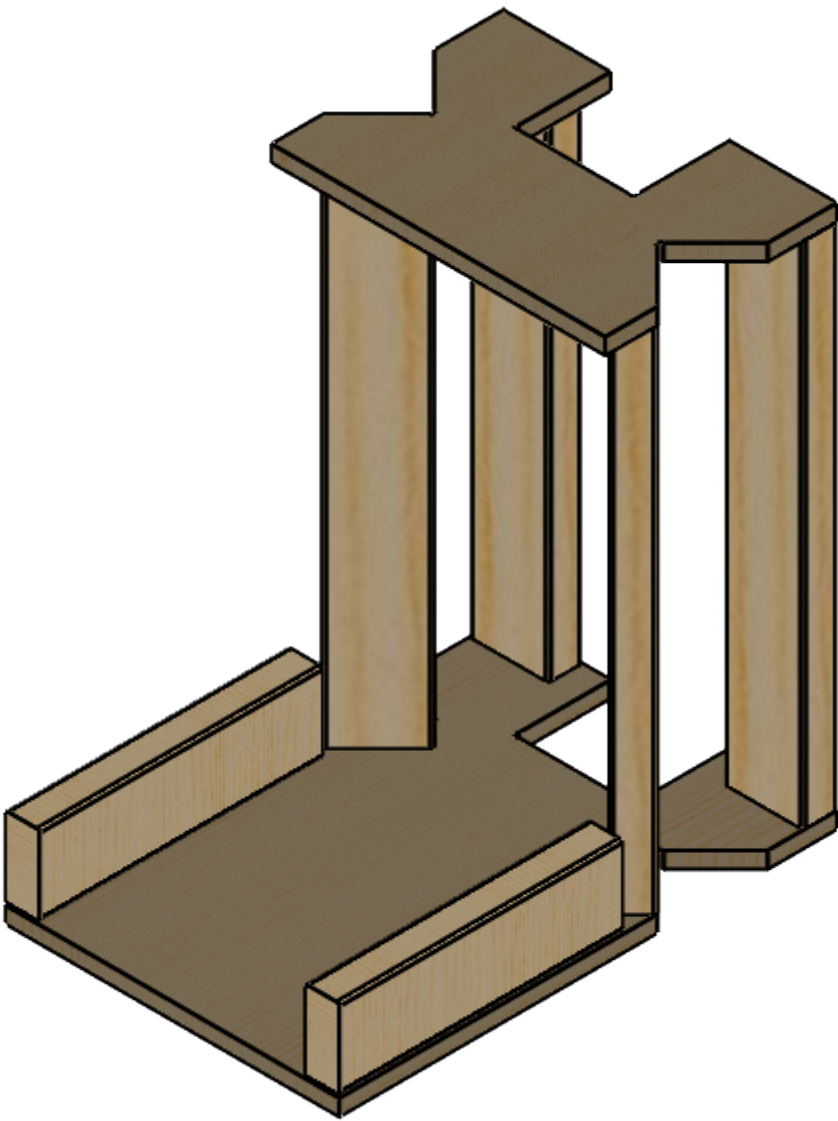
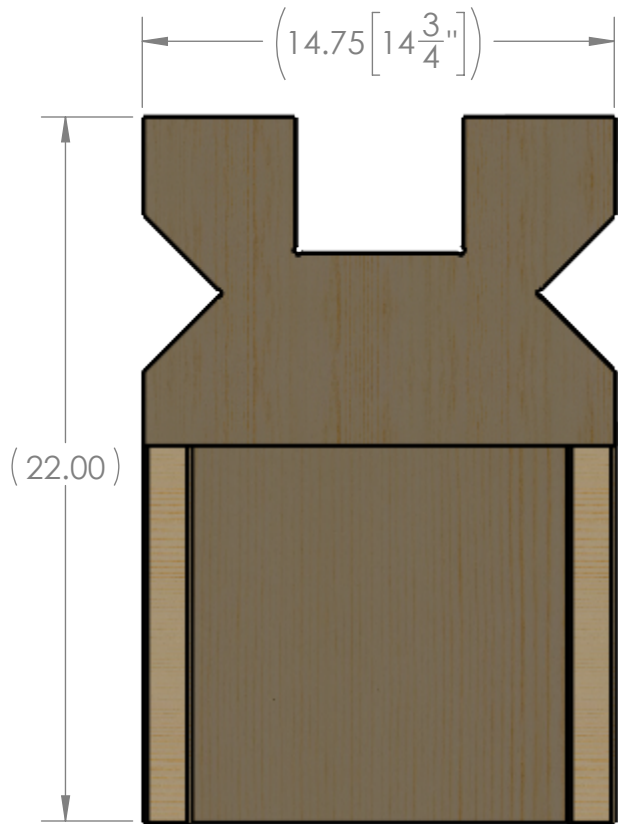
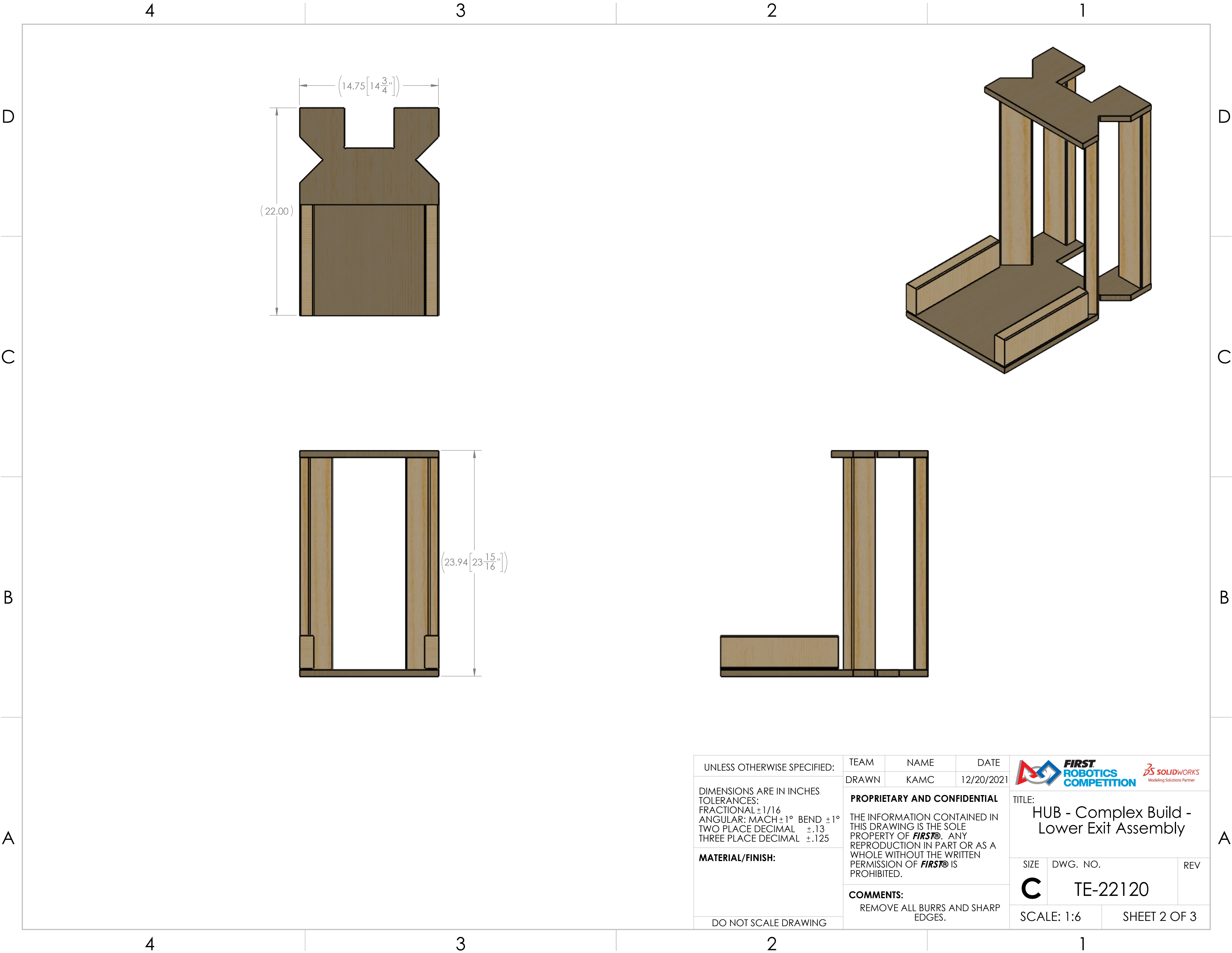




Hardware Needed:  
#8 x 2" Long Screw - Qty 16

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22101	HUB - Complex Build - Fender and Lower Exit Vertical 2x4	4
2	TE-22122	HUB - Complex Build - Lower Exit Bottom with Loop Assembly	1
3	TE-22124	HUB - Complex Build - Lower Exit Removable Edge with Hook Assembly	2
4	TE-22125	HUB - Complex Build - Lower Exit Top	1

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	<div></div>		
		DRAWN	KAMC	12/20/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125		PROPRIETARY AND CONFIDENTIAL			TITLE:		
		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			HUB - Complex Build - Lower Exit Assembly		
MATERIAL/FINISH:		COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
					C	TE-22120	
DO NOT SCALE DRAWING					SCALE: 1:6		SHEET 1 OF 3



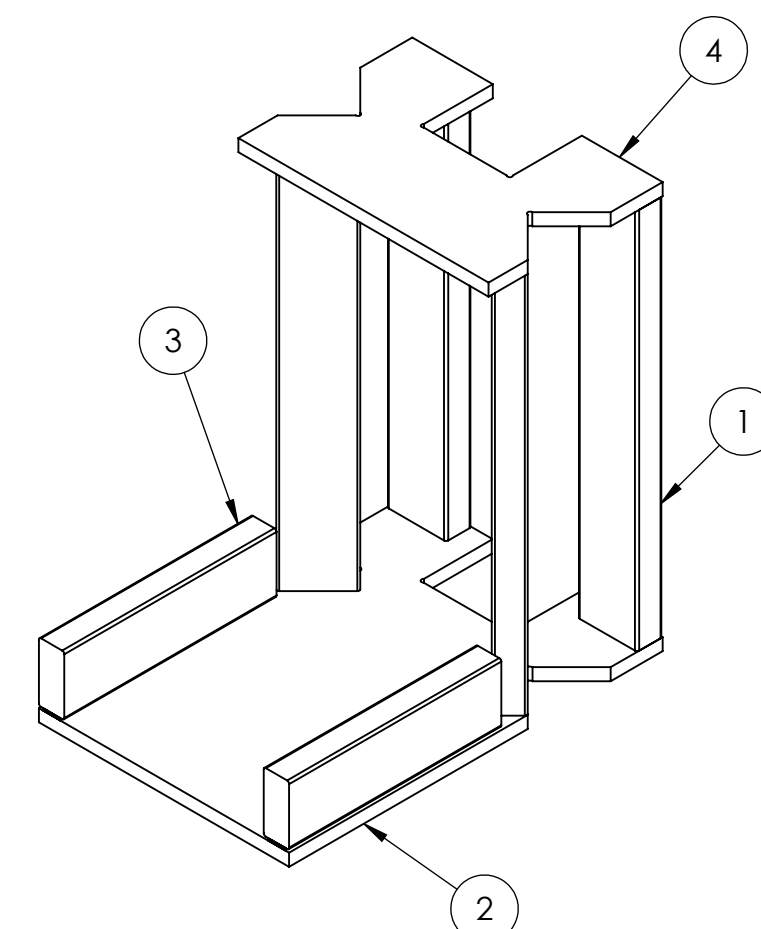




UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>     <b>DO NOT SCALE DRAWING</b>	TEAM	NAME	DATE	 	
	DRAWN	KAMC	12/20/2021		
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE: HUB - Complex Build - Lower Exit Assembly	
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.
C				TE-22120	
SCALE: 1:6				SHEET 2 OF 3	

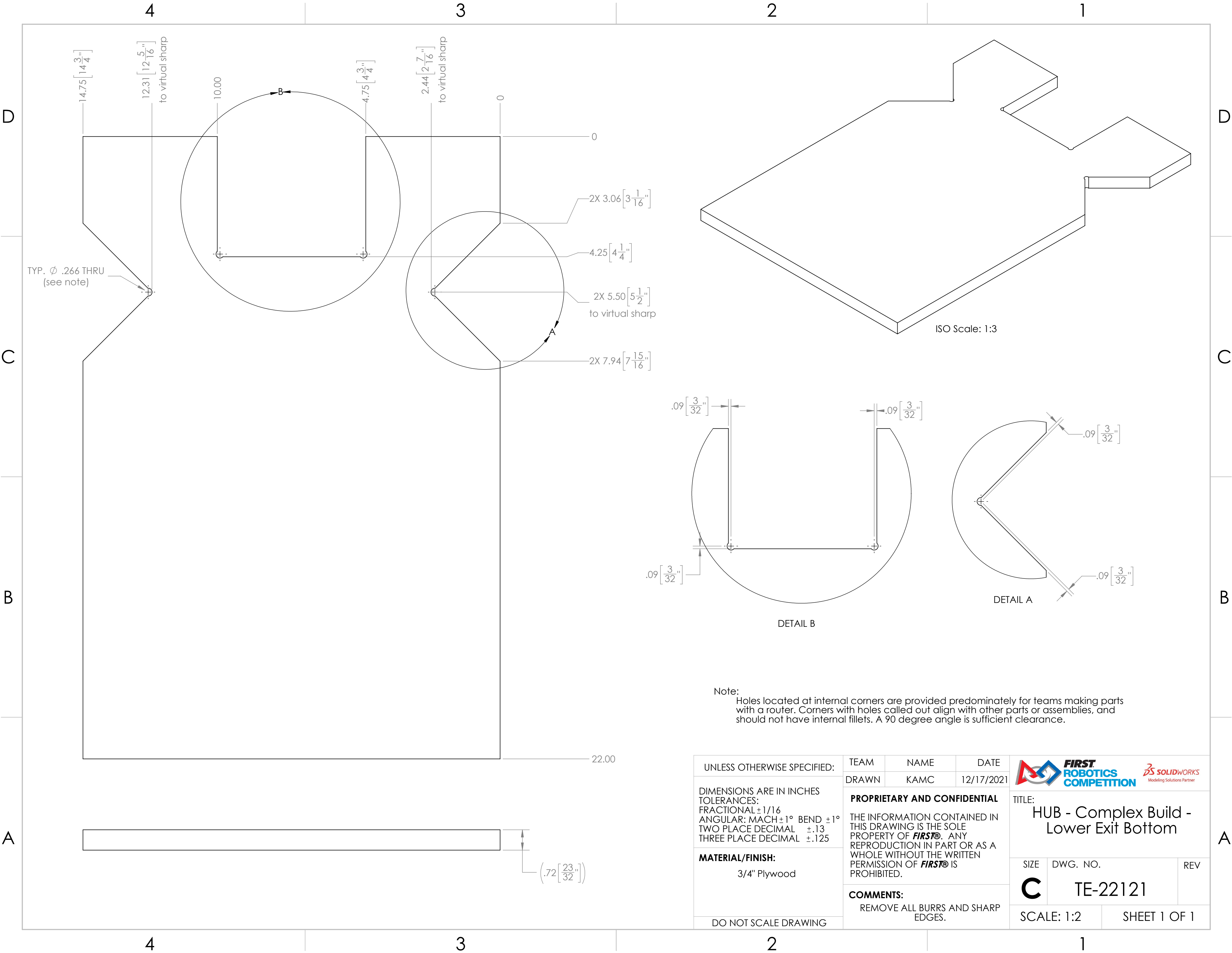
1

3D perspective view of the assembly. The base plate is labeled with a dimension of  $(3.50 [3 \frac{1}{2}"])$ . Callout 1 points to the vertical plate, and callout 2 points to the horizontal plate.



The diagram shows a complex, symmetrical shape with a central rectangular area. Two arrows point from the text "Align to Edge" to the left and right vertical edges of the central rectangle, indicating alignment constraints.



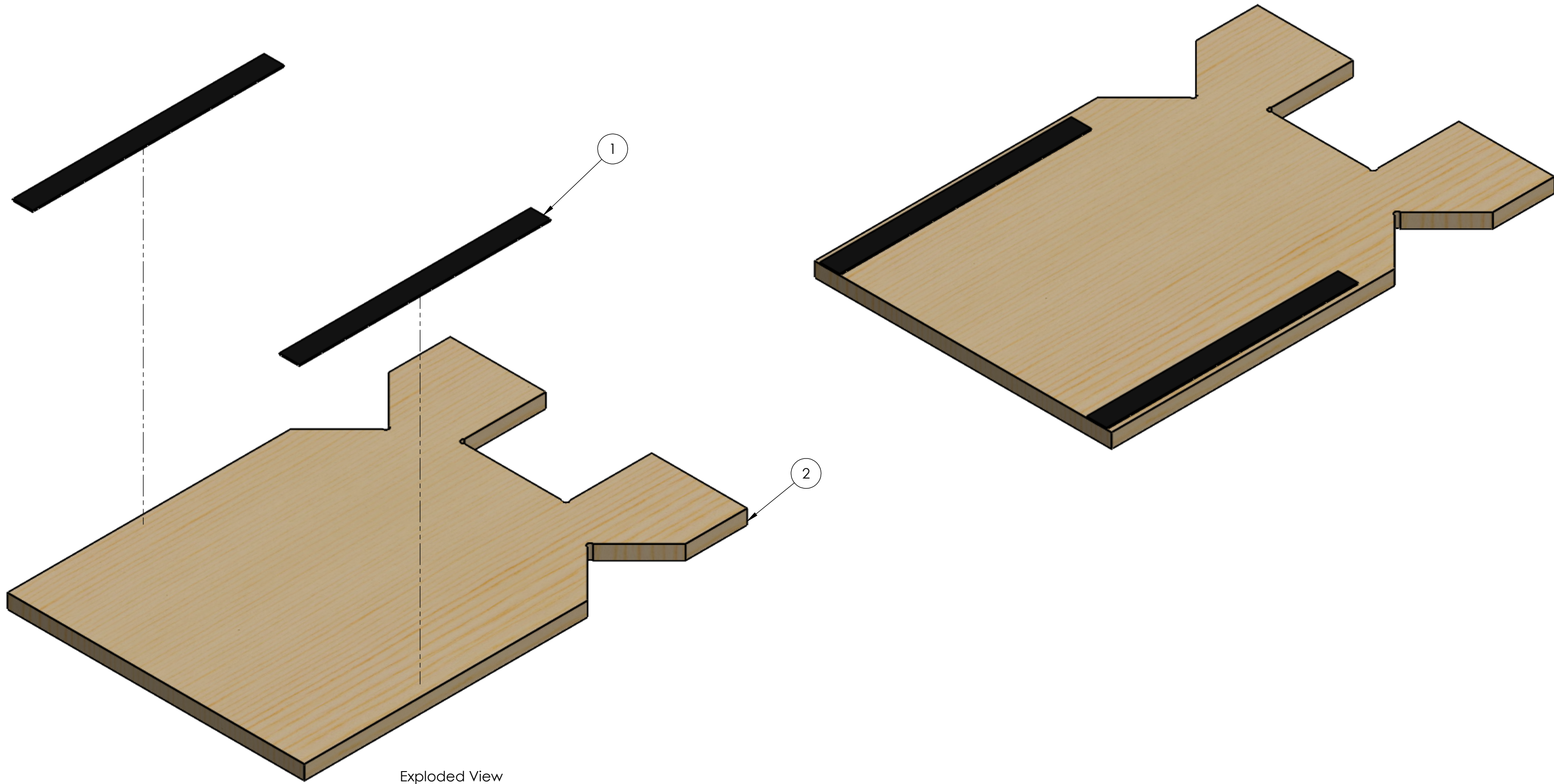
UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	<div></div>		
		DRAWN	KAMC	12/20/2021			
<p>DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL <math>\pm 1/16</math> ANGULAR: MACH <math>\pm 1^\circ</math> BEND <math>\pm 1^\circ</math> TWO PLACE DECIMAL <math>\pm .13</math> THREE PLACE DECIMAL <math>\pm .125</math></p> <p><b>MATERIAL/FINISH:</b></p>		<p><b>PROPRIETARY AND CONFIDENTIAL</b></p> <p>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.</p>			<p>TITLE:</p> <p>HUB - Complex Build - Lower Exit Assembly</p>		
		<p><b>COMMENTS:</b></p> <p>REMOVE ALL BURRS AND SHARP EDGES.</p>					
		DO NOT SCALE DRAWING					SIZE
					C	TE-22120	
					SCALE: 1:8		SHEET 3 OF 3



Note:  
Holes located at internal corners are provided predominately for teams making parts with a router. Corners with holes called out align with other parts or assemblies, and should not have internal fillets. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>  3/4" Plywood  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div> <div>TITLE: HUB - Complex Build - Lower Exit Bottom</div>		
	DRAWN	KAMC	12/17/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE	DWG. NO.	REV
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			<b>C</b>	TE-22121	
SCALE: 1:2		SHEET 1 OF 1				







Exploded View

Hardware Needed:  
Optional: Wood Staples

Step 1

1. Attach ① to ② using adhesive backing. Align as shown on Sheet 2.
2. Optional: Use wood staples to connect ① to ② .

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Loop_1_12.5	1" x 12.5" Loop, Adhesive Backed	2
2	TE-22121	HUB - Complex Build - Lower Exit Bottom	1

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	<div></div>	
		DRAWN	KAMC	12/20/2021		
<div>DIMENSIONS ARE IN INCHES</div> <div>TOLERANCES:</div> <div>FRACTIONAL ±1/16</div> <div>ANGULAR: MACH±1° BEND ±1°</div> <div>TWO PLACE DECIMAL ±.13</div> <div>THREE PLACE DECIMAL ±.125</div> <div>MATERIAL/FINISH:</div> <div>DO NOT SCALE DRAWING</div>		<div>PROPRIETARY AND CONFIDENTIAL</div> <div>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.</div> <div>COMMENTS:</div> <div>REMOVE ALL BURRS AND SHARP EDGES.</div>			TITLE: <div>HUB - Complex Build - Lower Exit Bottom with Loop Assembly</div>	
		SIZE		DWG. NO.		REV
		C		TE-22122		
		SCALE: 1:3		SHEET 1 OF 2		



D

C

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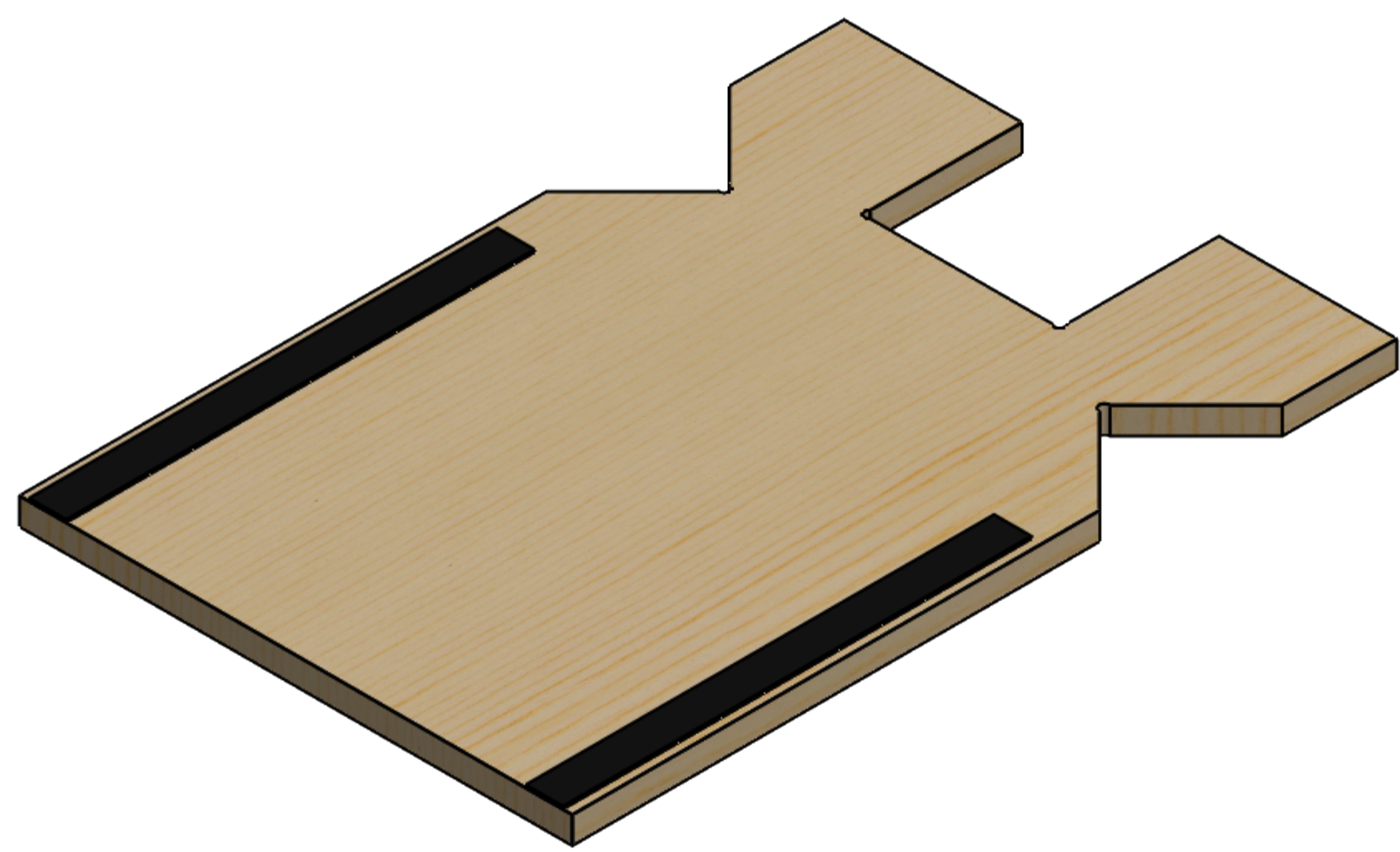
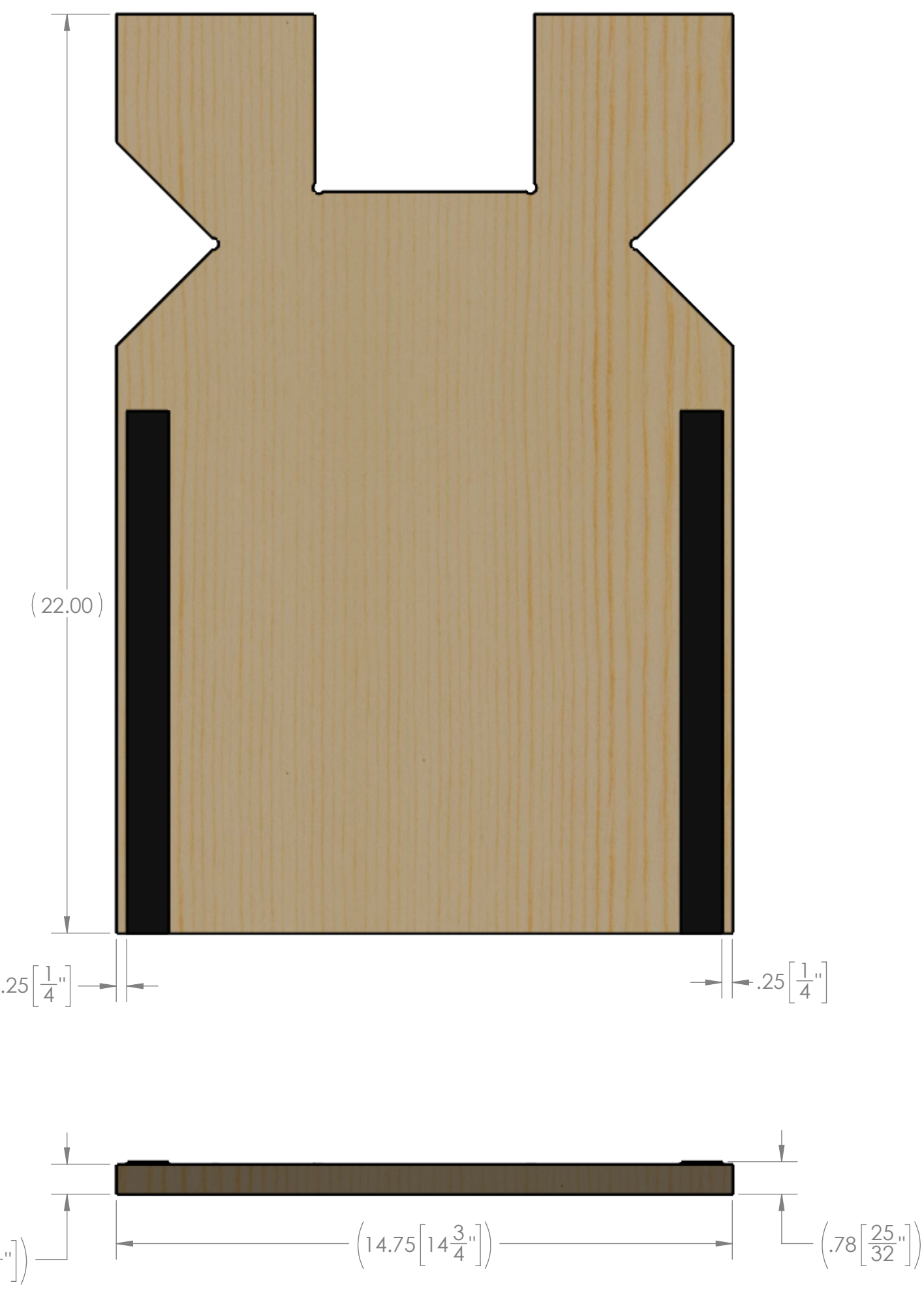
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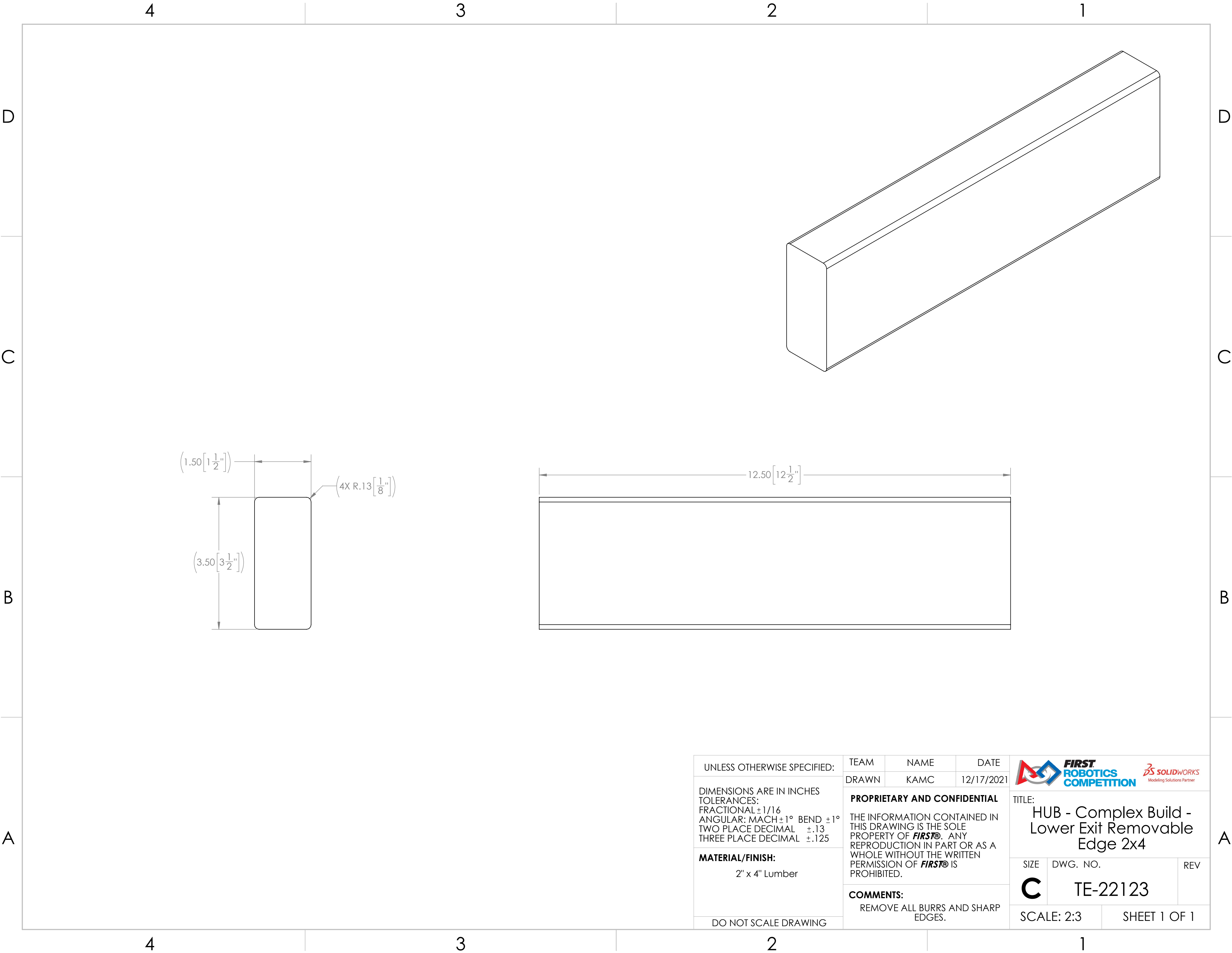
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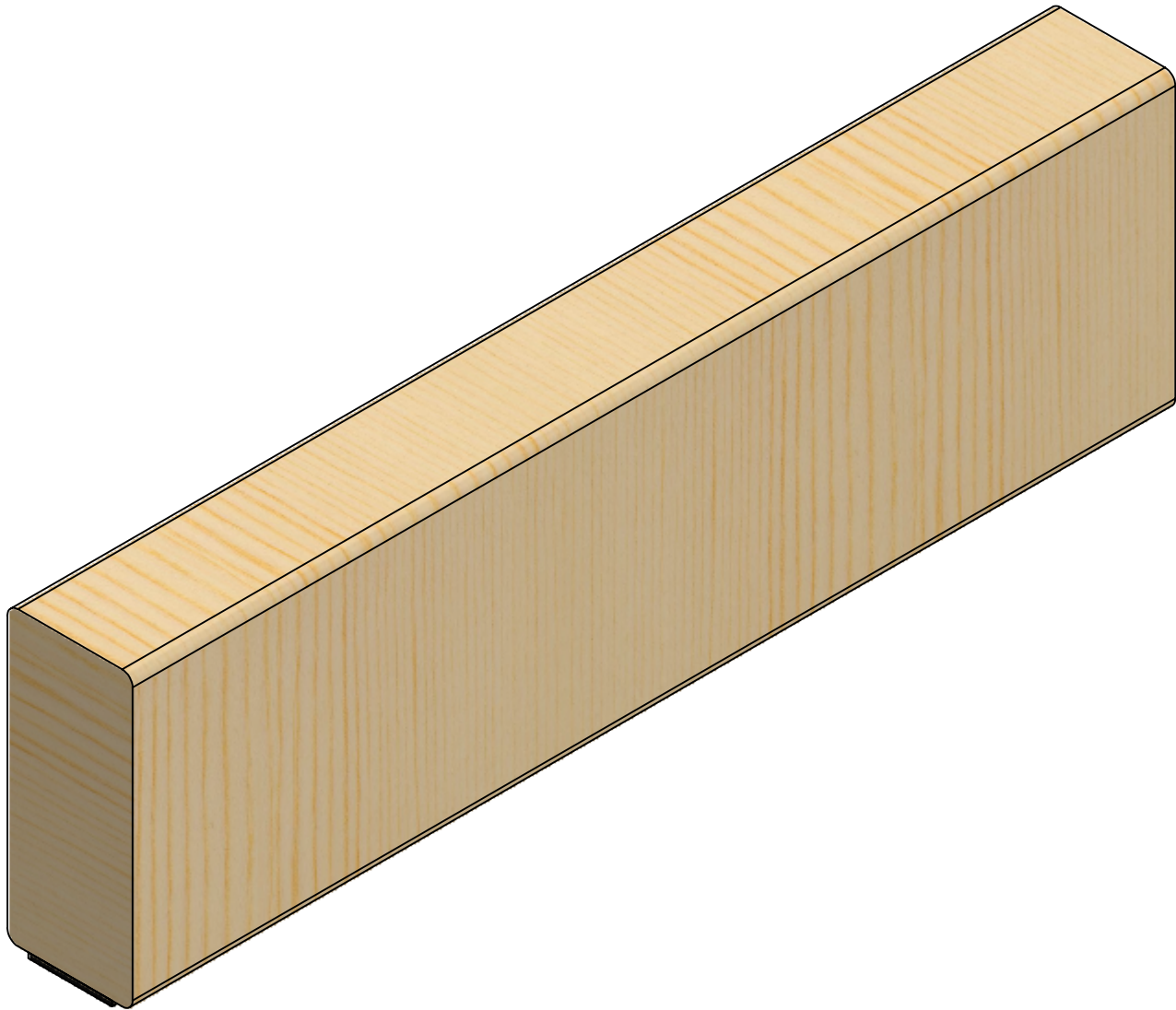
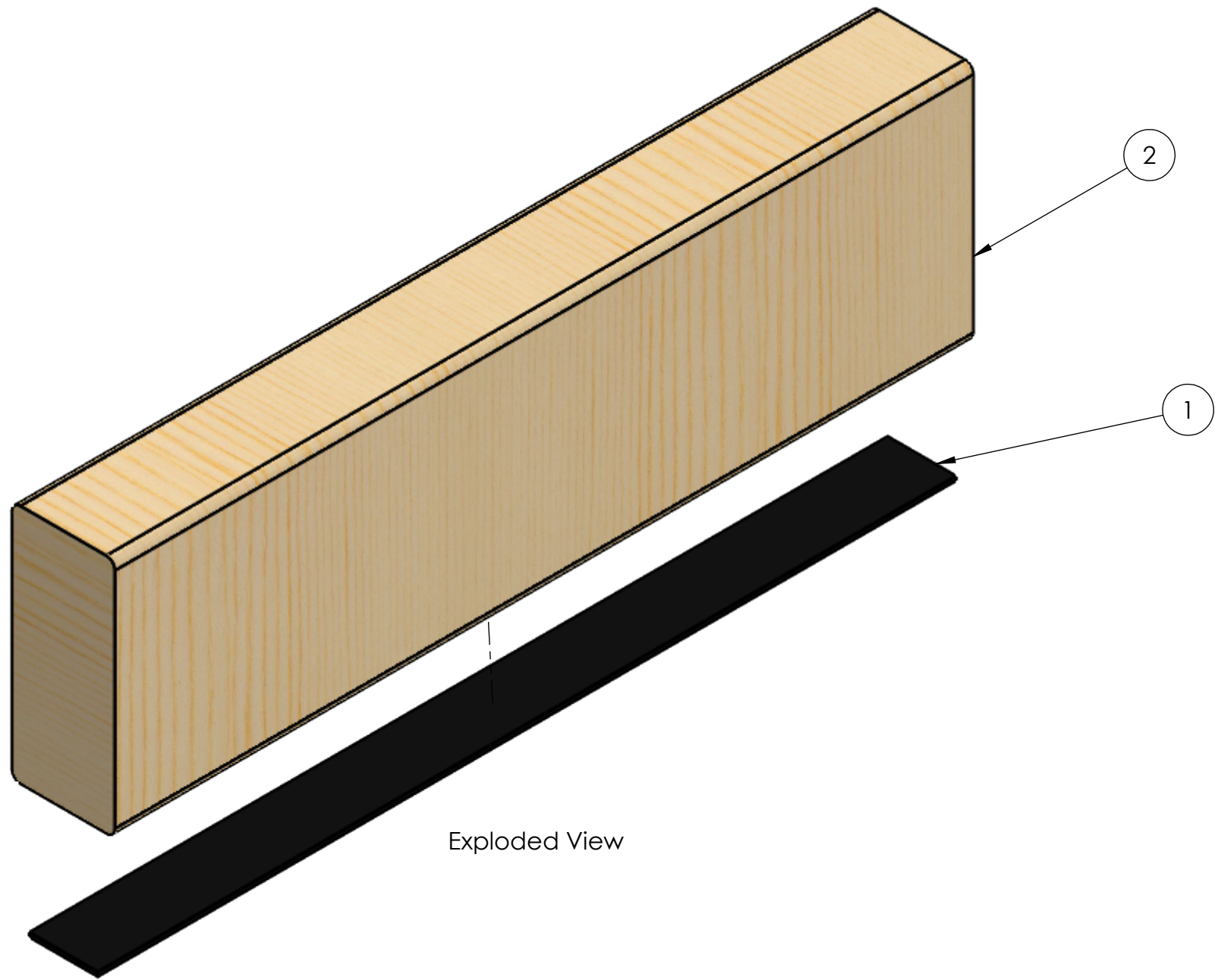


UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	 		
	DRAWN	KAMC	12/20/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE:  HUB - Complex Build - Lower Exit Bottom with Loop Assembly		
MATERIAL/FINISH:	COMMENTS:  REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
				C	TE-22122	
DO NOT SCALE DRAWING				SCALE: 1:3		SHEET 2 OF 2





UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/17/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>			TITLE:		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			HUB - Complex Build - Lower Exit Removable Edge 2x4		
				SIZE	DWG. NO.	REV
<b>MATERIAL/FINISH:</b>  2" x 4" Lumber	<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.			C	TE-22123	
DO NOT SCALE DRAWING						
				SCALE: 2:3		SHEET 1 OF 1





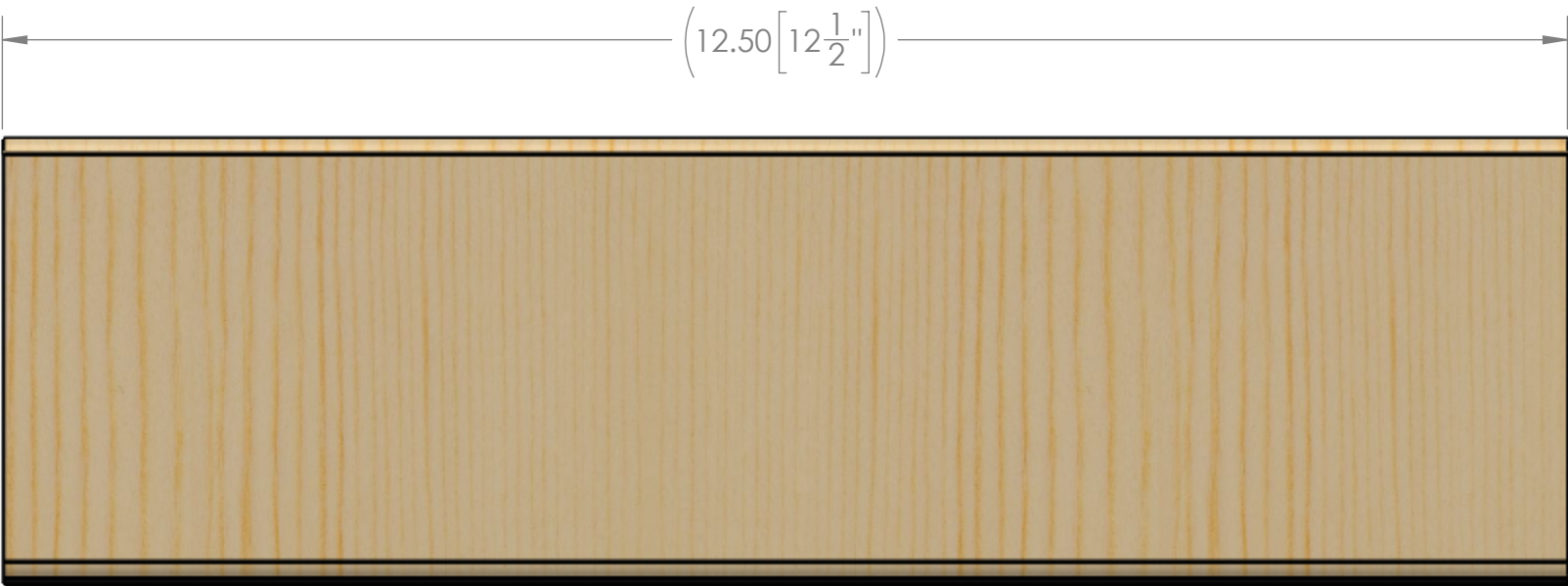
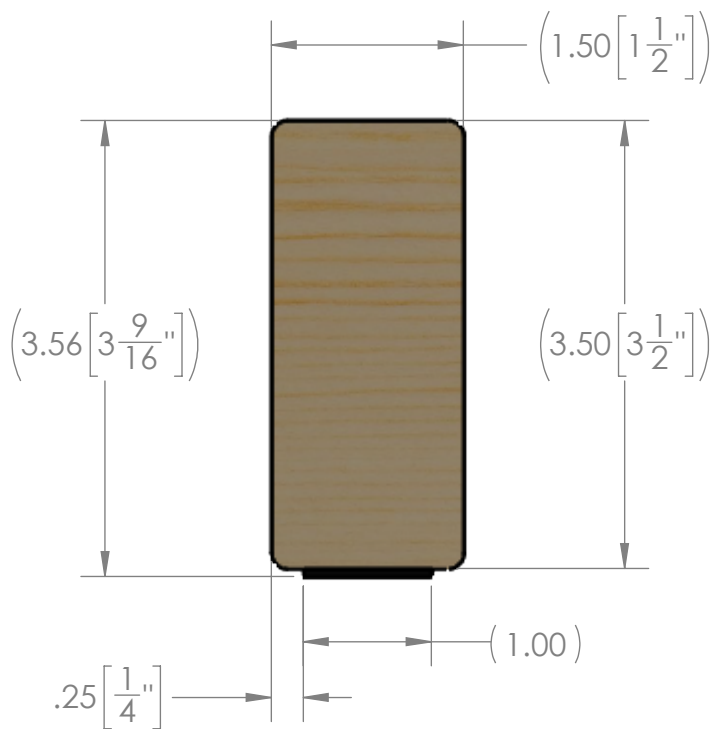
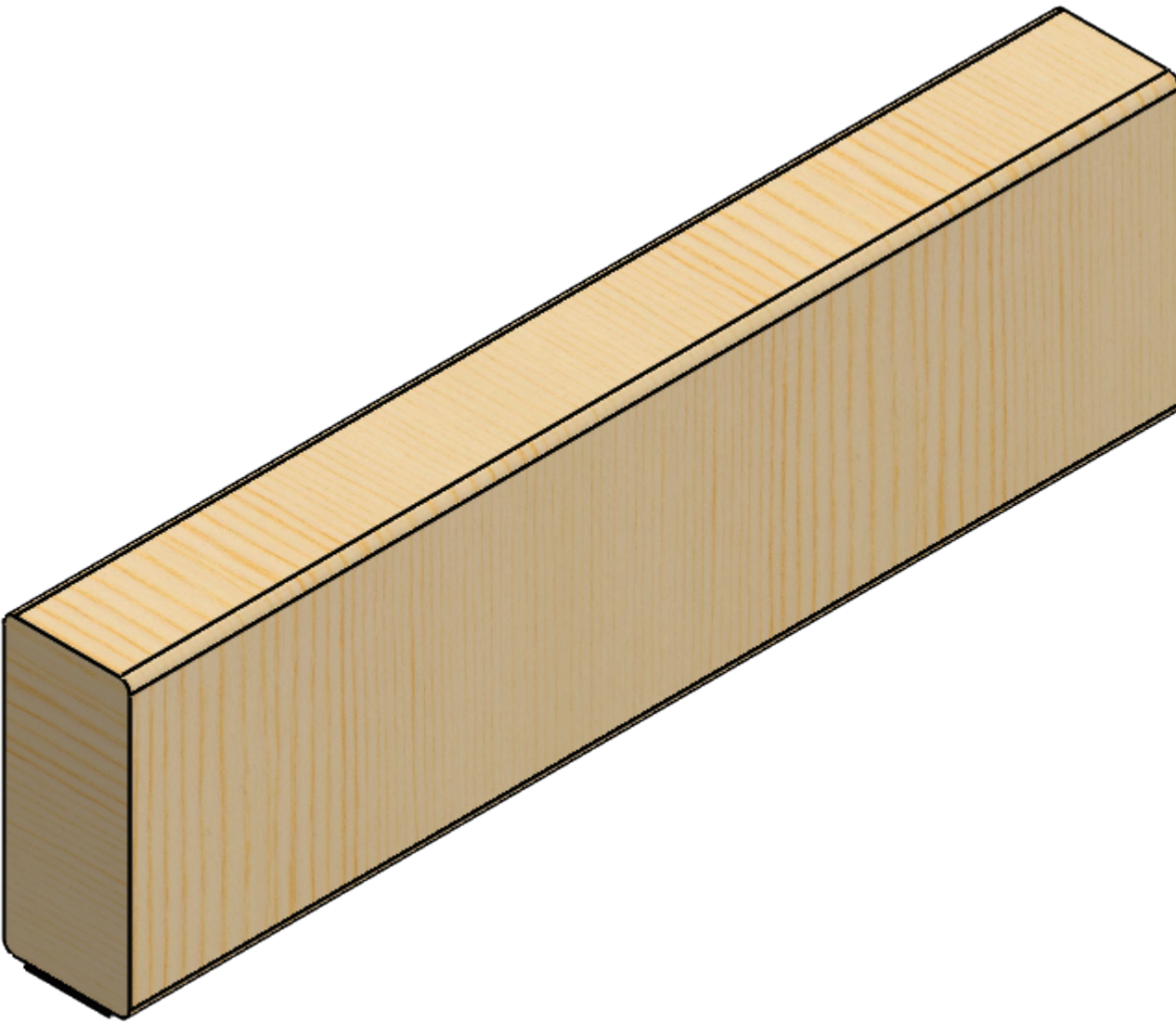
Step 1



- 1. Attach (1) to (2) as shown using adhesive backing.
- 2. Optional: Use wood staples to connect (1) to (2) .

Hardware Needed:  
Optional: Wood Staples

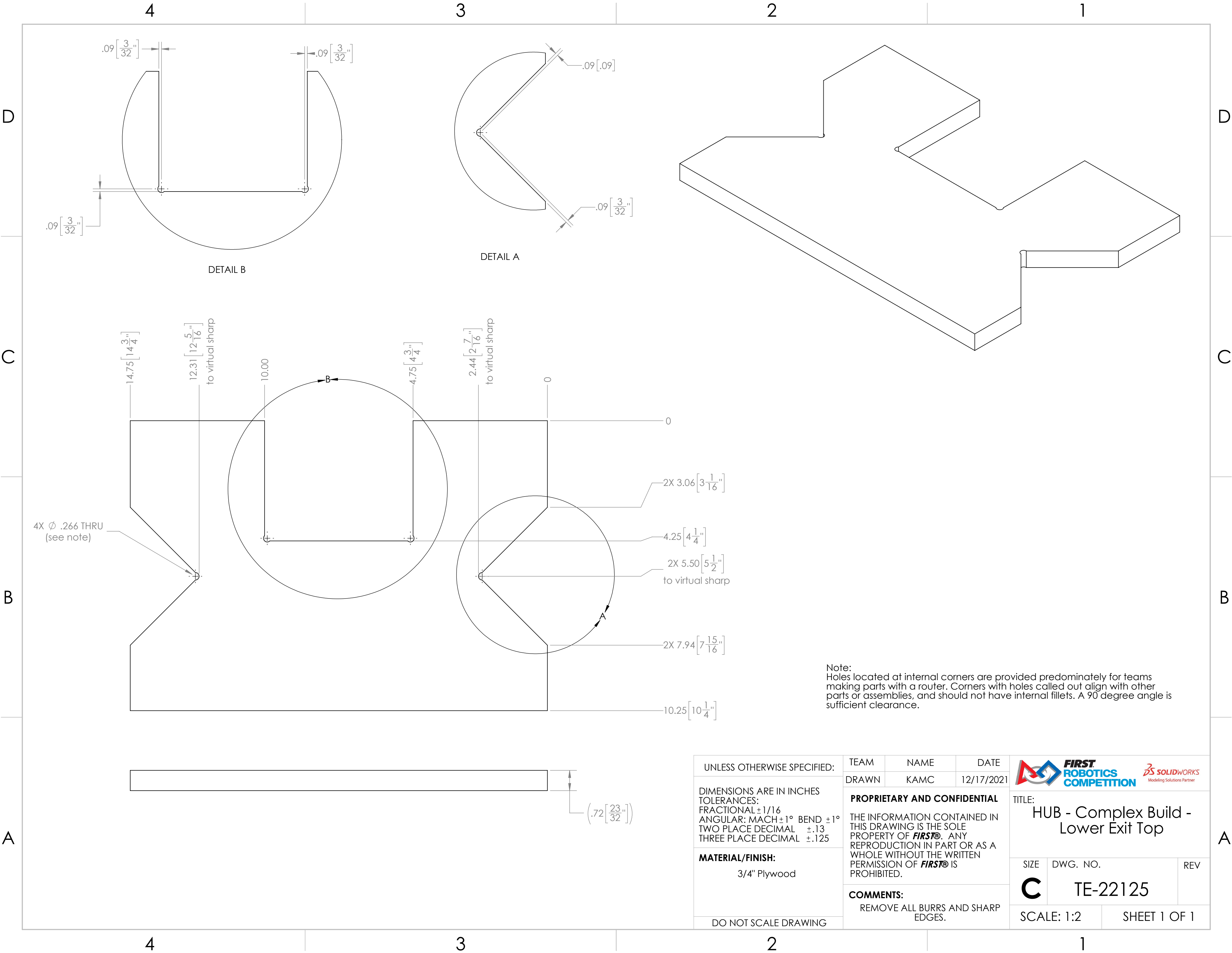
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Hook_1_12.5	1" x 12.5" Hook, Adhesive Backed	1
2	TE-22123	HUB - Complex Build - Lower Exit Removable Edge 2x4	1

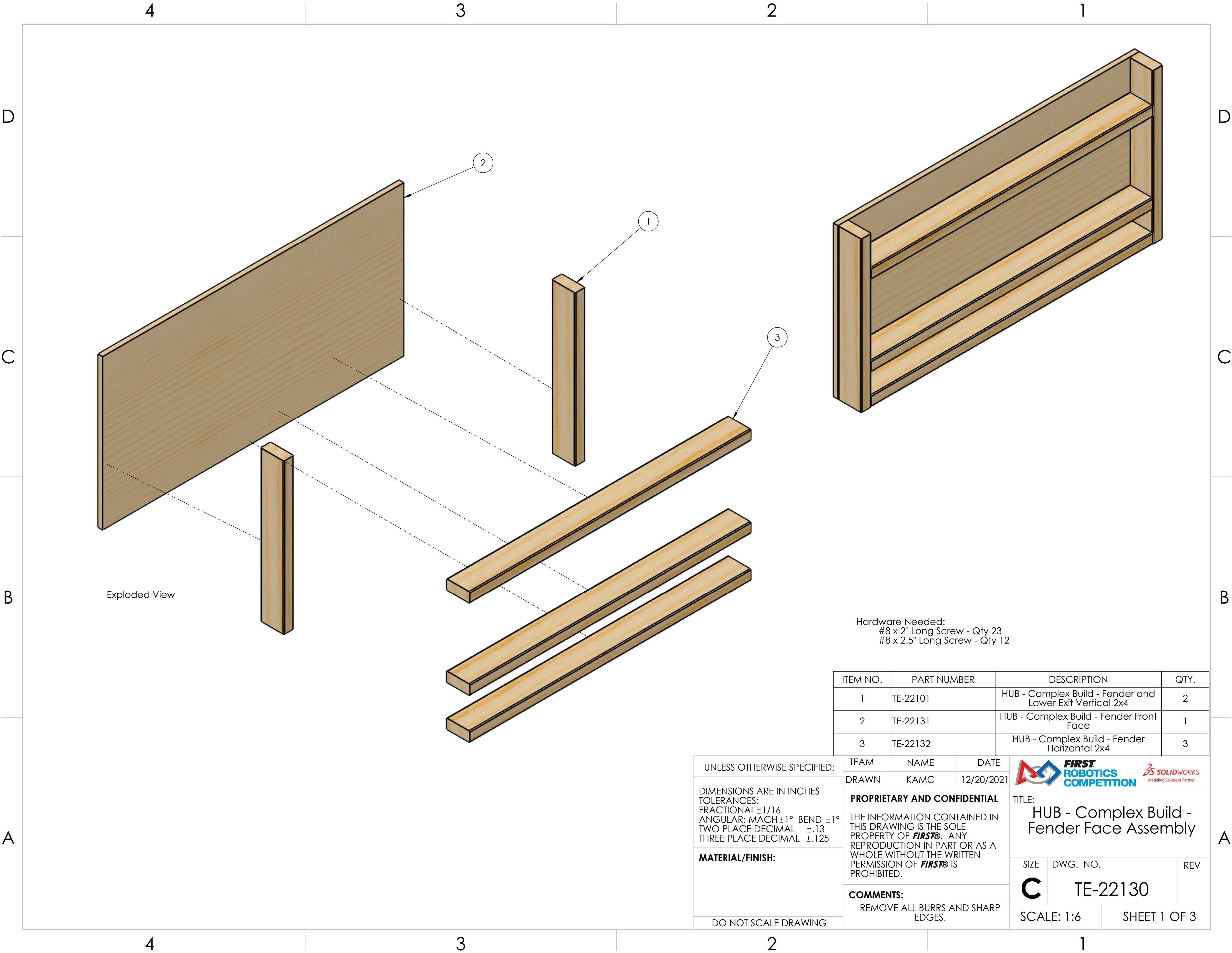
UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  MATERIAL/FINISH:    DO NOT SCALE DRAWING	TEAM DRAWN	NAME KAMC	DATE 12/17/2021	 	
	PROPRIETARY AND CONFIDENTIAL  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FIRST®. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FIRST® IS PROHIBITED.			TITLE: HUB - Complex Build - Lower Exit Removable Edge with Hook Assembly	
	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			SIZE C	DWG. NO. TE-22124
				SCALE: 2:3	REV SHEET 1 OF 2



UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/17/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>			TITLE:		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			HUB - Complex Build - Lower Exit Removable Edge with Hook Assembly		
				SIZE	DWG. NO.	REV
<b>MATERIAL/FINISH:</b>	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			<b>C</b>	TE-22124	
DO NOT SCALE DRAWING				SCALE: 2:3		SHEET 2 OF 2







Exploded View

Hardware Needed:  
#8 x 2" Long Screw - Qty 23  
#8 x 2.5" Long Screw - Qty 12

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22101	HUB - Complex Build - Fender and Lower Exit Vertical 2x4	2
2	TE-22131	HUB - Complex Build - Fender Front Face	1
3	TE-22132	HUB - Complex Build - Fender Horizontal 2x4	3

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$

**MATERIAL/FINISH:**



DO NOT SCALE DRAWING

TEAM NAME DATE  
DRAWN KAMC 12/20/2021

**PROPRIETARY AND CONFIDENTIAL**

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF **FIRST®**. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF **FIRST®** IS PROHIBITED.

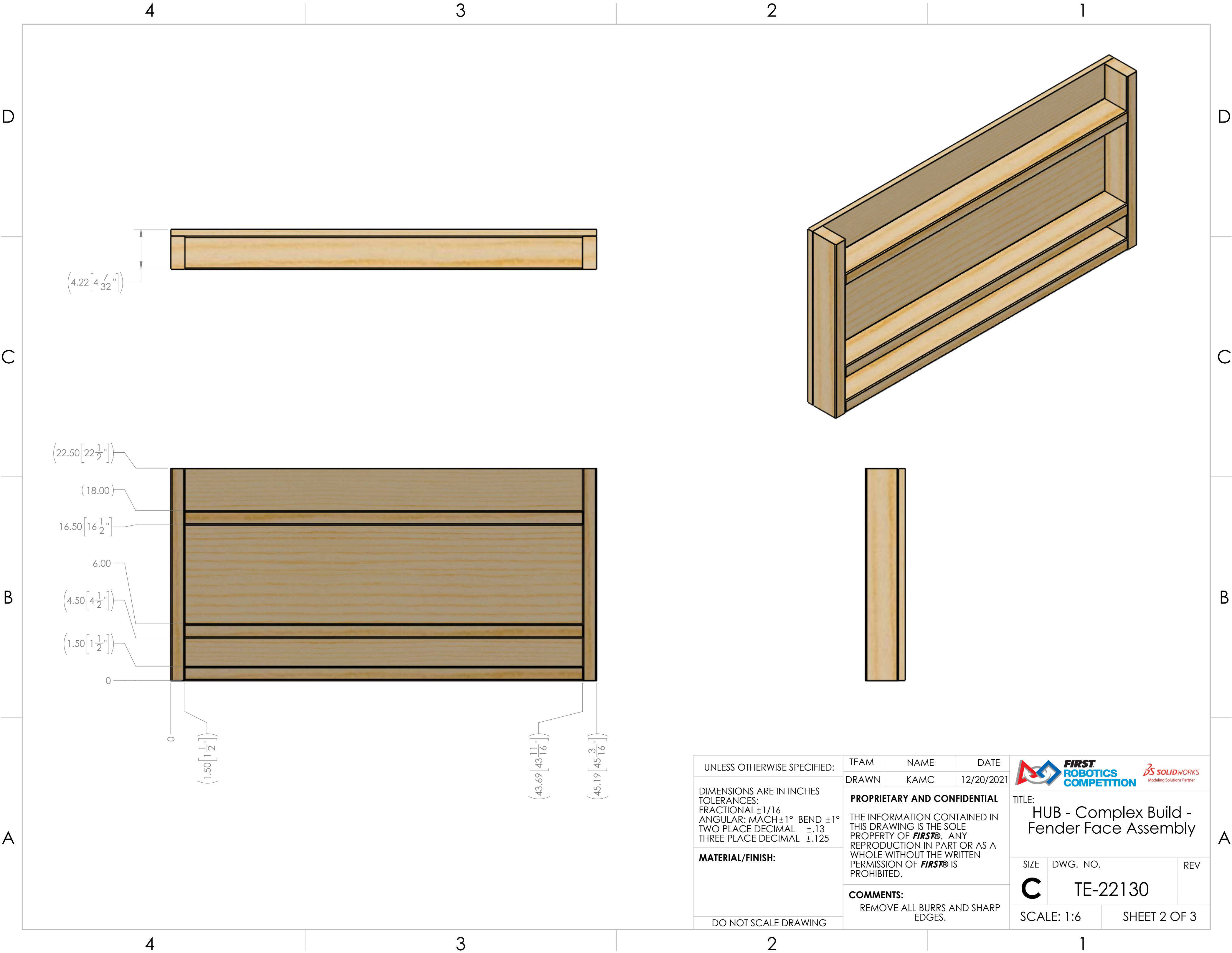
**COMMENTS:**  
REMOVE ALL BURRS AND SHARP EDGES.





TITLE:  
**HUB - Complex Build - Fender Face Assembly**

SIZE	DWG. NO.	REV
<b>C</b>	<b>TE-22130</b>	
SCALE: 1:6		SHEET 1 OF 3



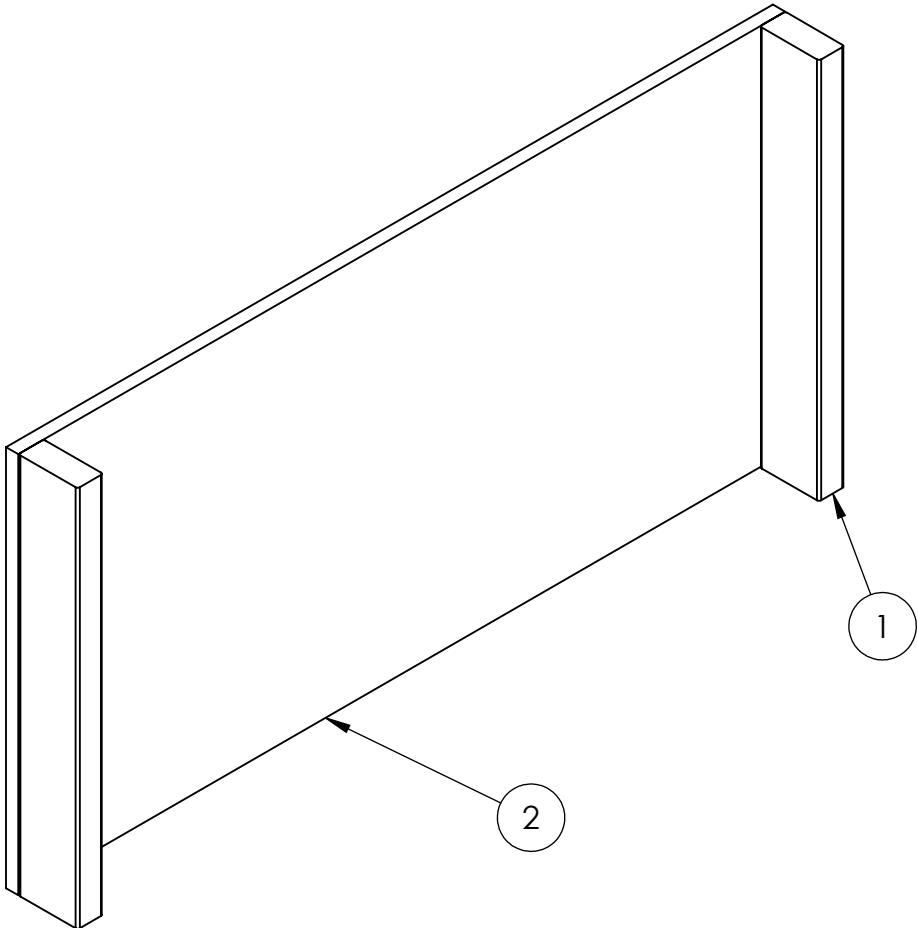


UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  MATERIAL/FINISH:   DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	KAMC	12/20/2021		
	PROPRIETARY AND CONFIDENTIAL  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.				TITLE: HUB - Complex Build - Fender Face Assembly
	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.				SIZE <b>C</b>
		DWG. NO.		REV	
		TE-22130			
		SCALE: 1:6		SHEET 2 OF 3	

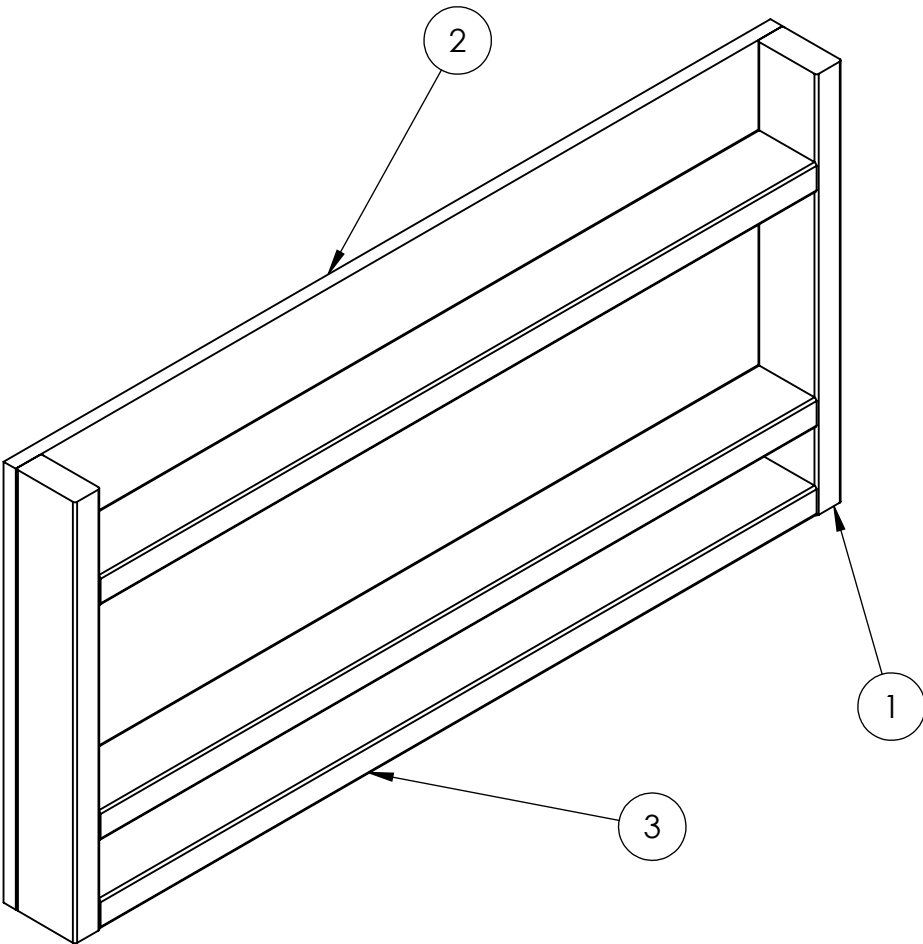
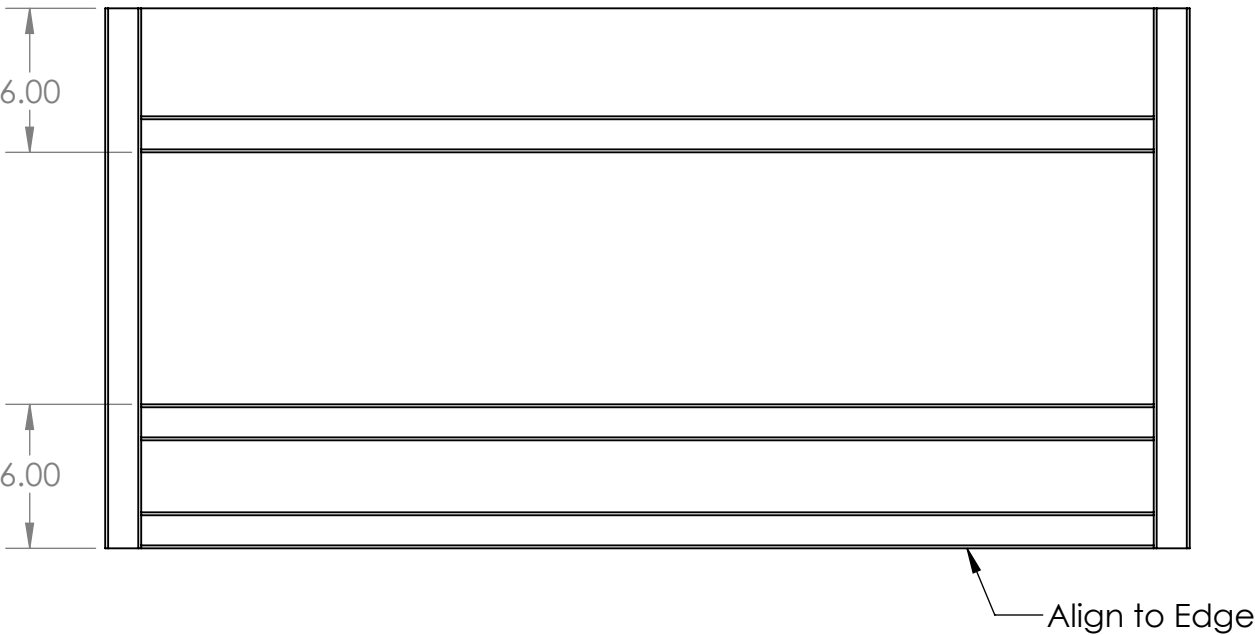




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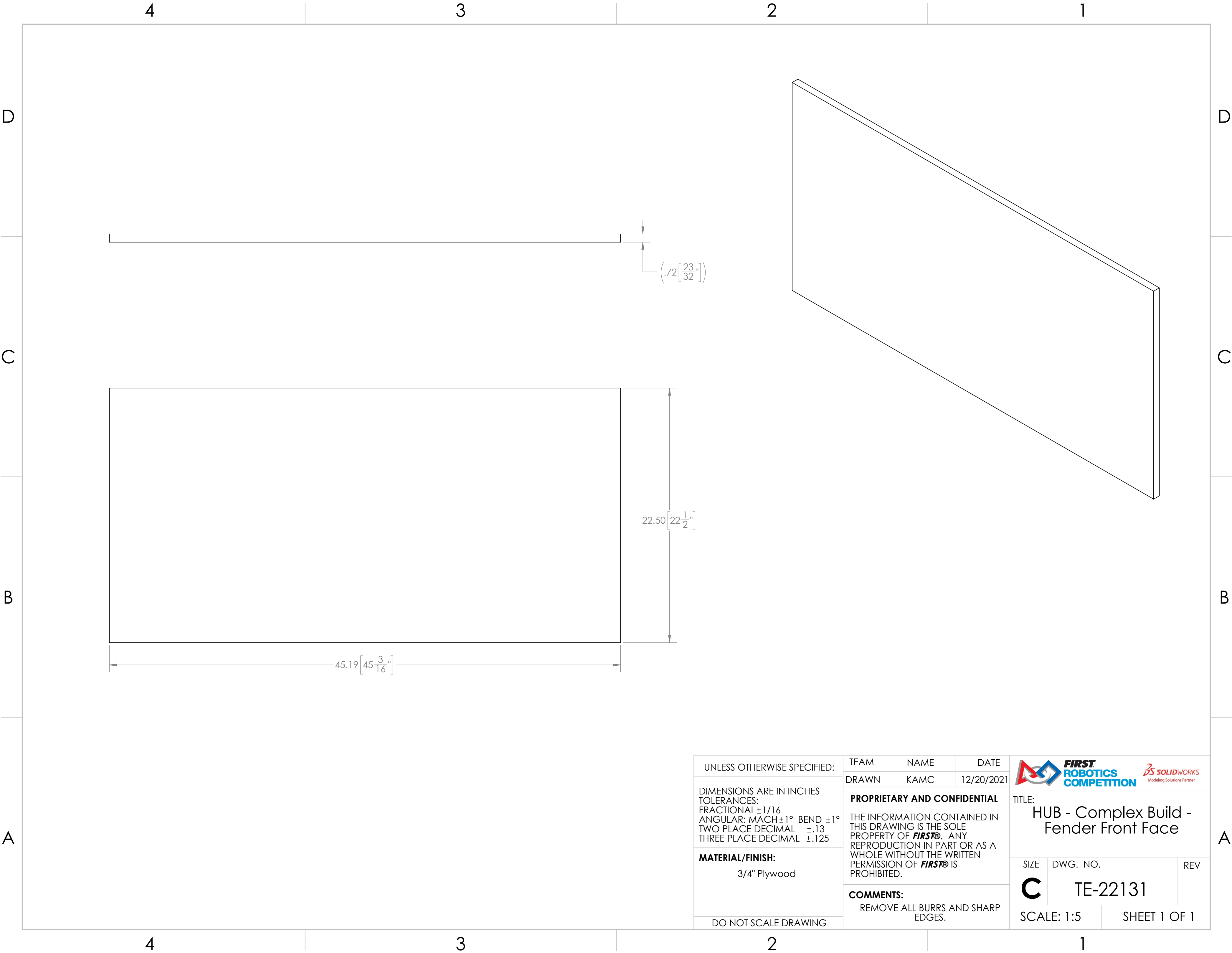
1. Align 2x (1) to the edges of (2), as shown.
2. Connect using 2" long screws. It is recommended to use 4x screws into each (1).





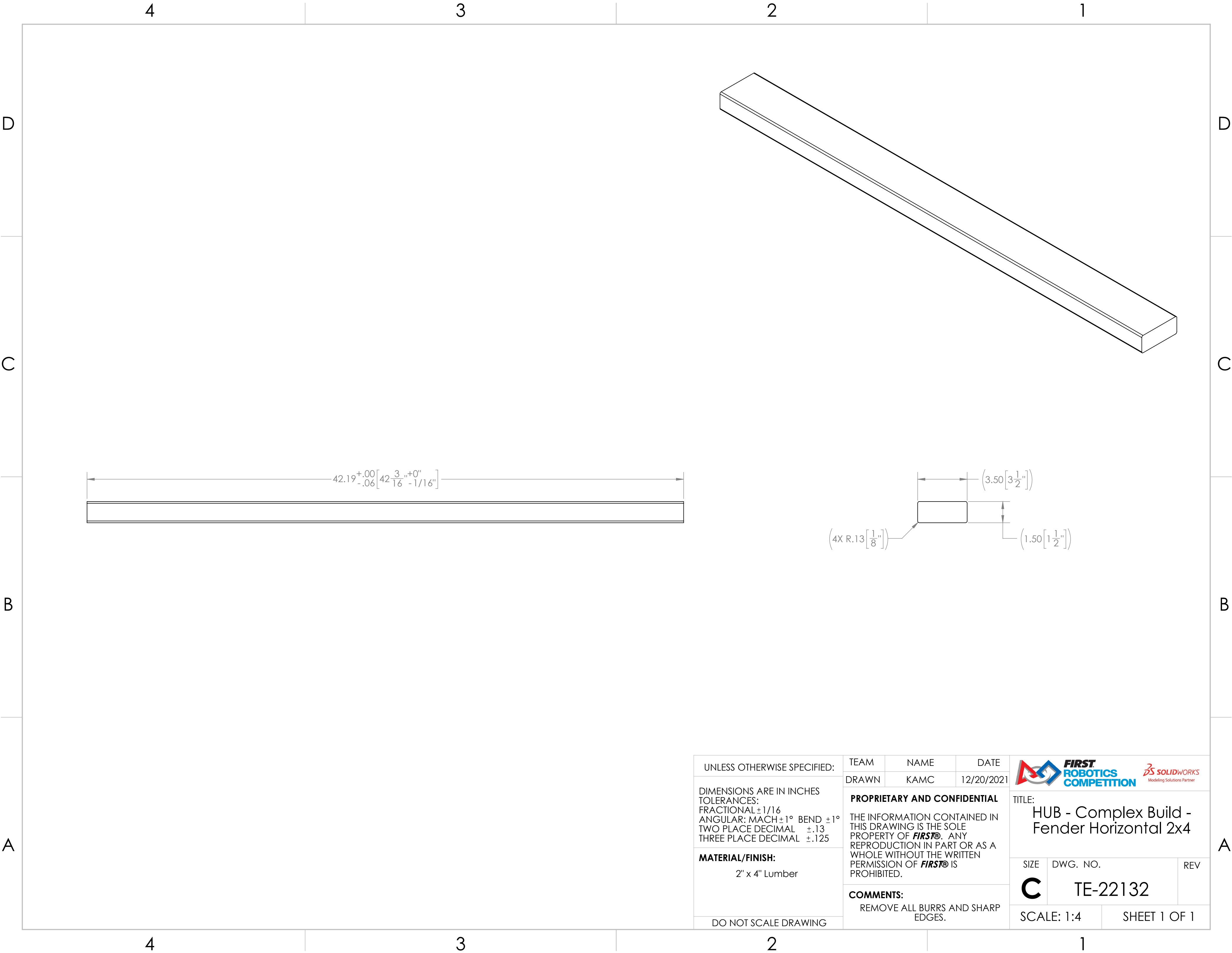
- Align 3x (3) between both (1), and position on (2) as shown. If needed, trim (3) to ensure fit.
- Secure each (3) to (1) using 2.5" long screws. It is recommended to use 2x screws into each end of (3).
- Secure (3) to (2) using 2" long screws. It is recommended to use 5x screws into each (3).





UNLESS OTHERWISE SPECIFIED:		TEAM		NAME		DATE			
		DRAWN		KAMC		12/20/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125		<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.				TITLE:  HUB - Complex Build - Fender Face Assembly			
<b>MATERIAL/FINISH:</b>						SIZE		DWG. NO.	
						C			
DO NOT SCALE DRAWING		COMMENTS:  REMOVE ALL BURRS AND SHARP EDGES.				SCALE: 1:8		SHEET 3 OF 3	
									

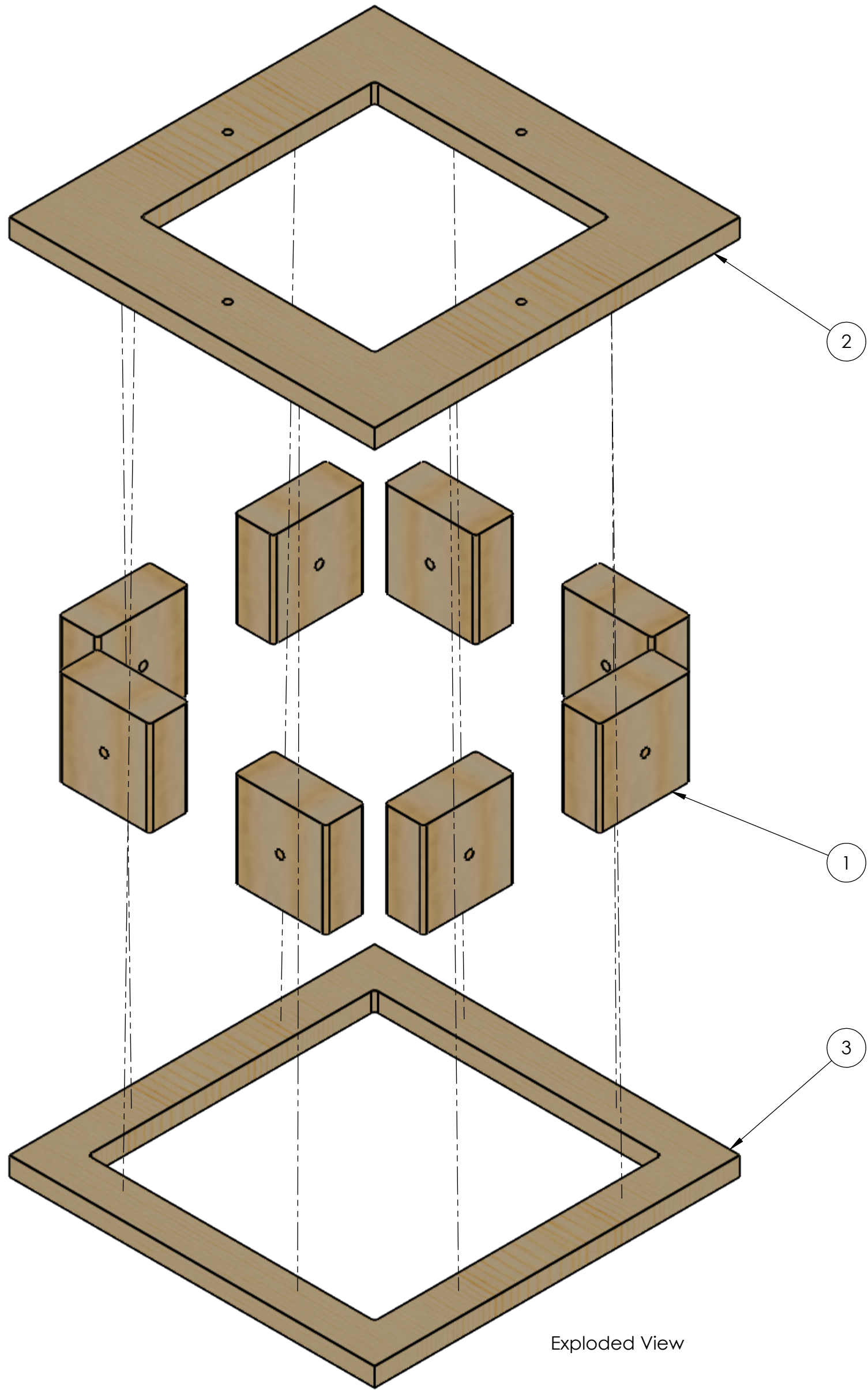


UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/20/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE: HUB - Complex Build - Fender Front Face		
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
C				TE-22131		
MATERIAL/FINISH:  3/4" Plywood	DO NOT SCALE DRAWING			SCALE: 1:5		SHEET 1 OF 1

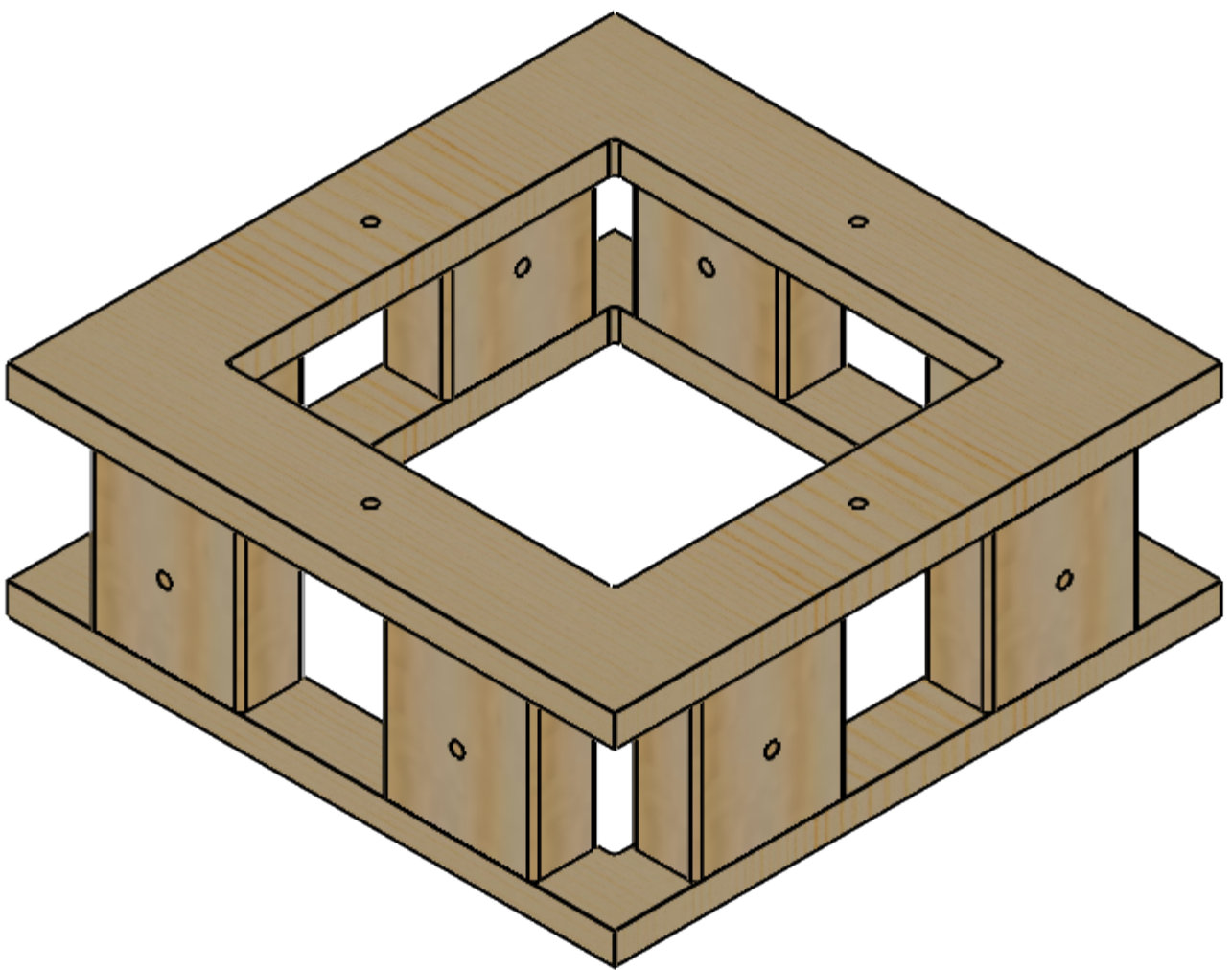


UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>  2" x 4" Lumber   DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/20/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE: HUB - Complex Build - Fender Horizontal 2x4		
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE <b>C</b>	DWG. NO. TE-22132	REV
SCALE: 1:4		SHEET 1 OF 1				







Exploded View



Note:  
Use TE-22140-AM if pairing with AndyMark Upper Hub (AM-4671)

Hardware Needed:  
#8 x 2" Long Screw - Qty 32

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22141	HUB - Complex Build - Connection Box 2x4	8
2	TE-22142	HUB - Complex Build - Connection Box Top	1
3	TE-22143	HUB - Complex Build - Connection Box Bottom	1

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	<div></div>	
		DRAWN	KAMC	12/20/2021		
<p>DIMENSIONS ARE IN INCHES</p> <p>TOLERANCES:</p> <p>FRACTIONAL <math>\pm 1/16</math></p> <p>ANGULAR: MACH <math>\pm 1^\circ</math> BEND <math>\pm 1^\circ</math></p> <p>TWO PLACE DECIMAL <math>\pm .13</math></p> <p>THREE PLACE DECIMAL <math>\pm .125</math></p> <p><b>MATERIAL/FINISH:</b></p> <p><b>DO NOT SCALE DRAWING</b></p>		<p><b>PROPRIETARY AND CONFIDENTIAL</b></p> <p>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.</p> <p><b>COMMENTS:</b></p> <p>REMOVE ALL BURRS AND SHARP EDGES.</p>			TITLE:	
					HUB - Complex Build - Connection Box Assembly	
					SIZE	DWG. NO.
			C	TE-22140		
			SCALE: 1:3		SHEET 1 OF 3	



4

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1

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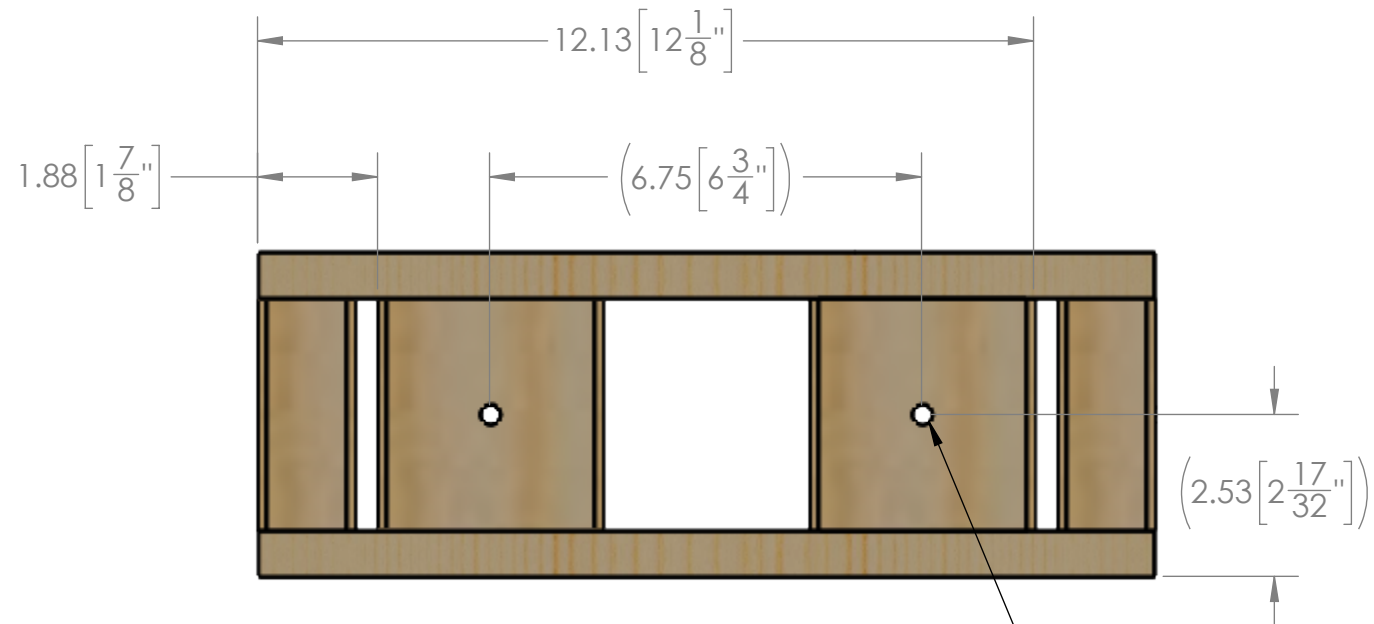
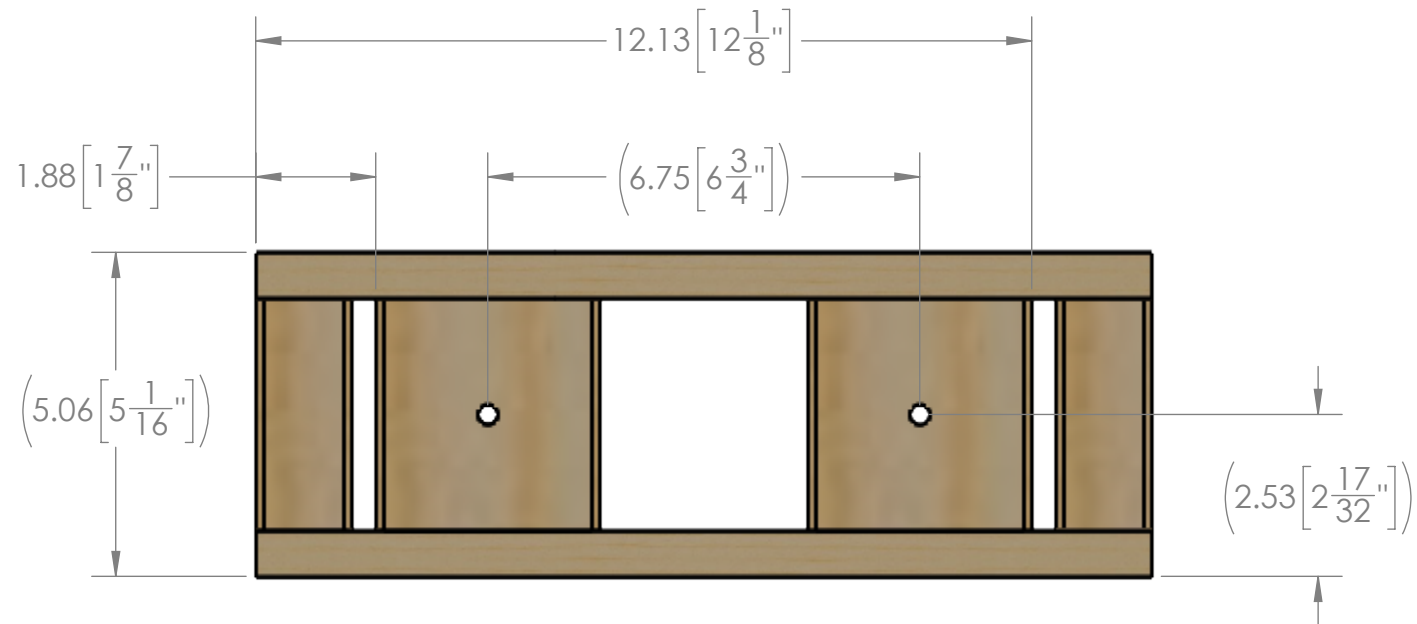
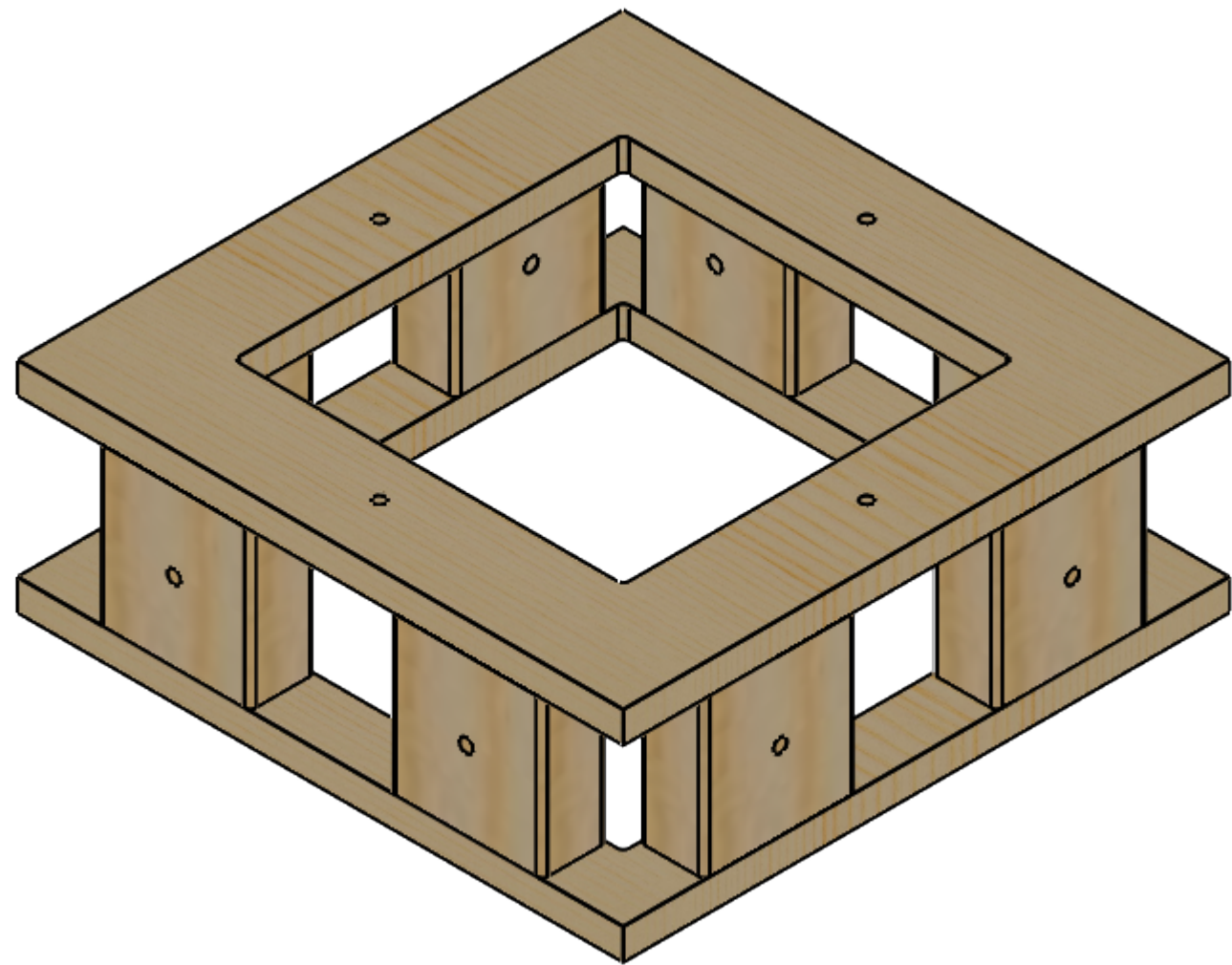
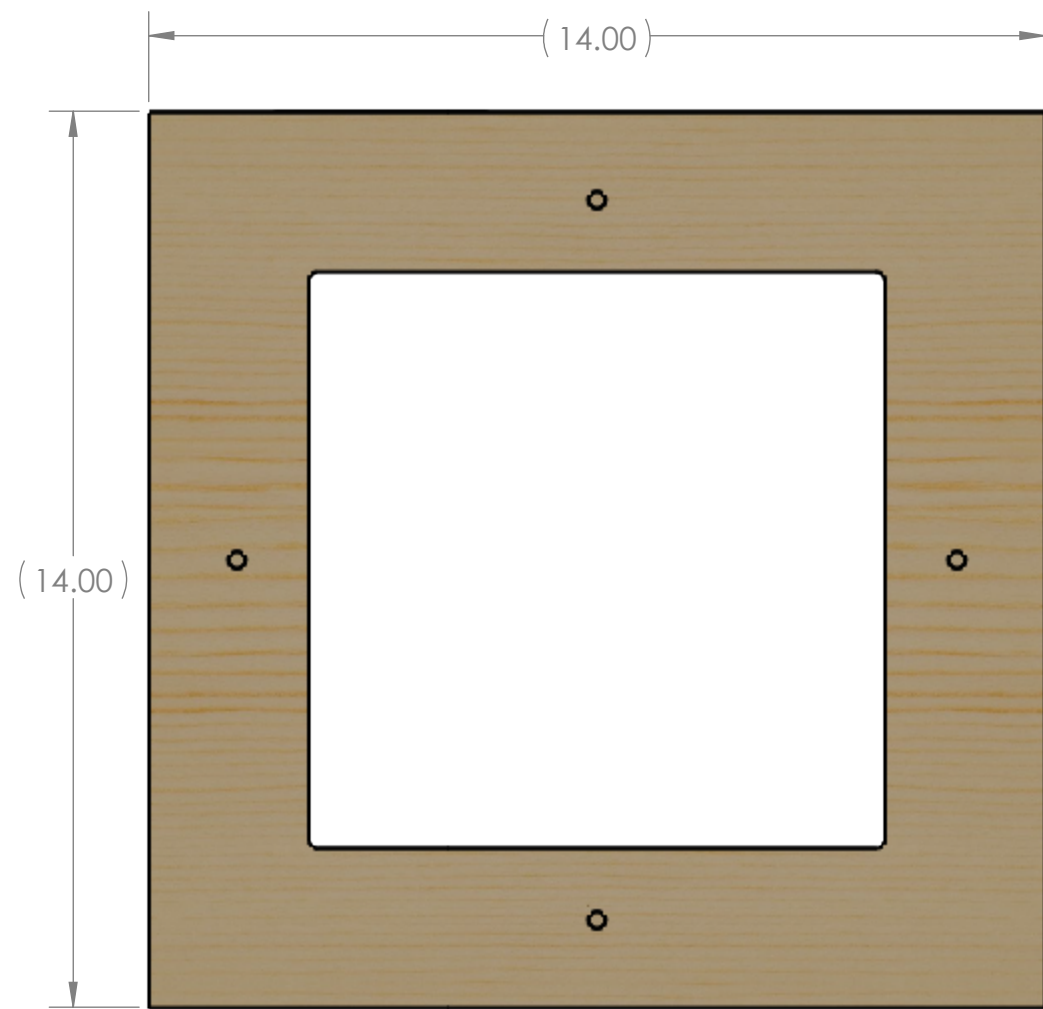
C

B

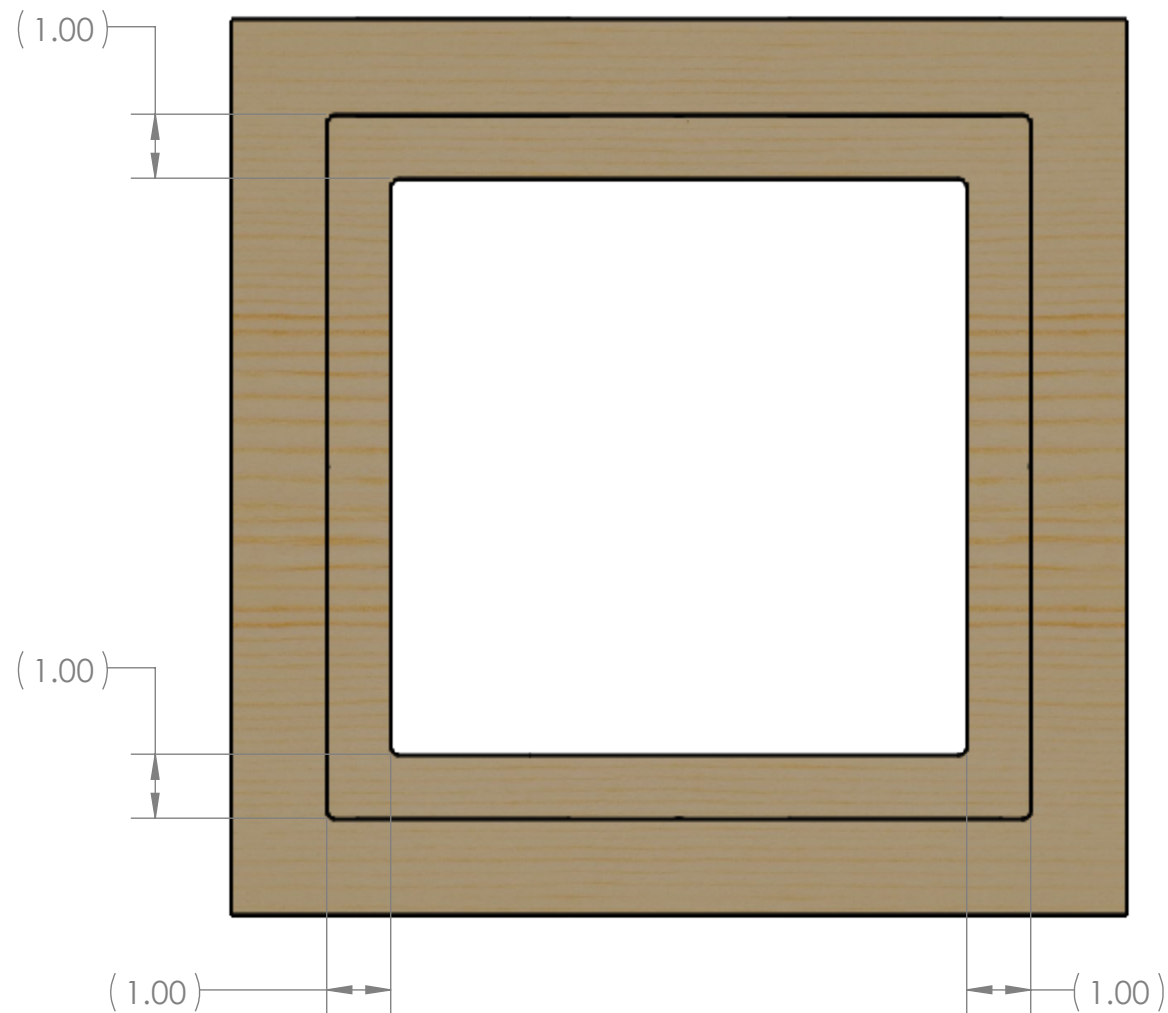
B



A

A



Note: Hole should be centered in 2"x4".  
This is NOT the case for TE-22141-AM configuration.



UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	 		
	DRAWN	KAMC	12/20/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			TITLE: HUB - Complex Build - Connection Box Assembly		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.					
MATERIAL/FINISH:	COMMENTS:			SIZE	DWG. NO.	REV
				C	TE-22140	
DO NOT SCALE DRAWING	REMOVE ALL BURRS AND SHARP EDGES.			SCALE: 1:3		SHEET 2 OF 3

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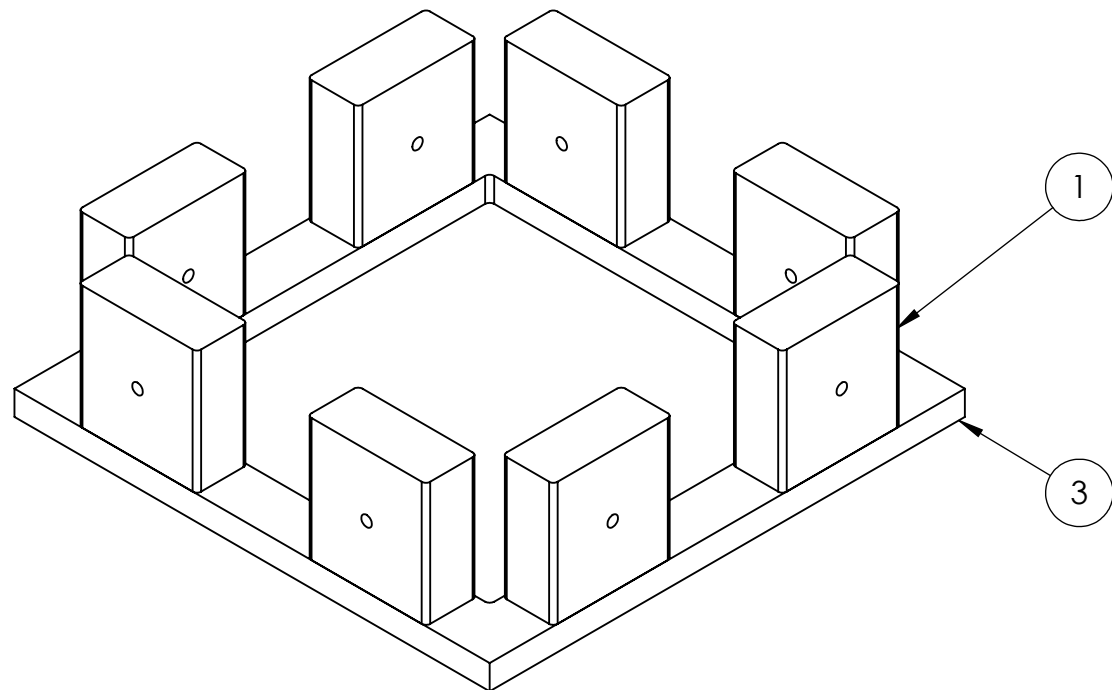
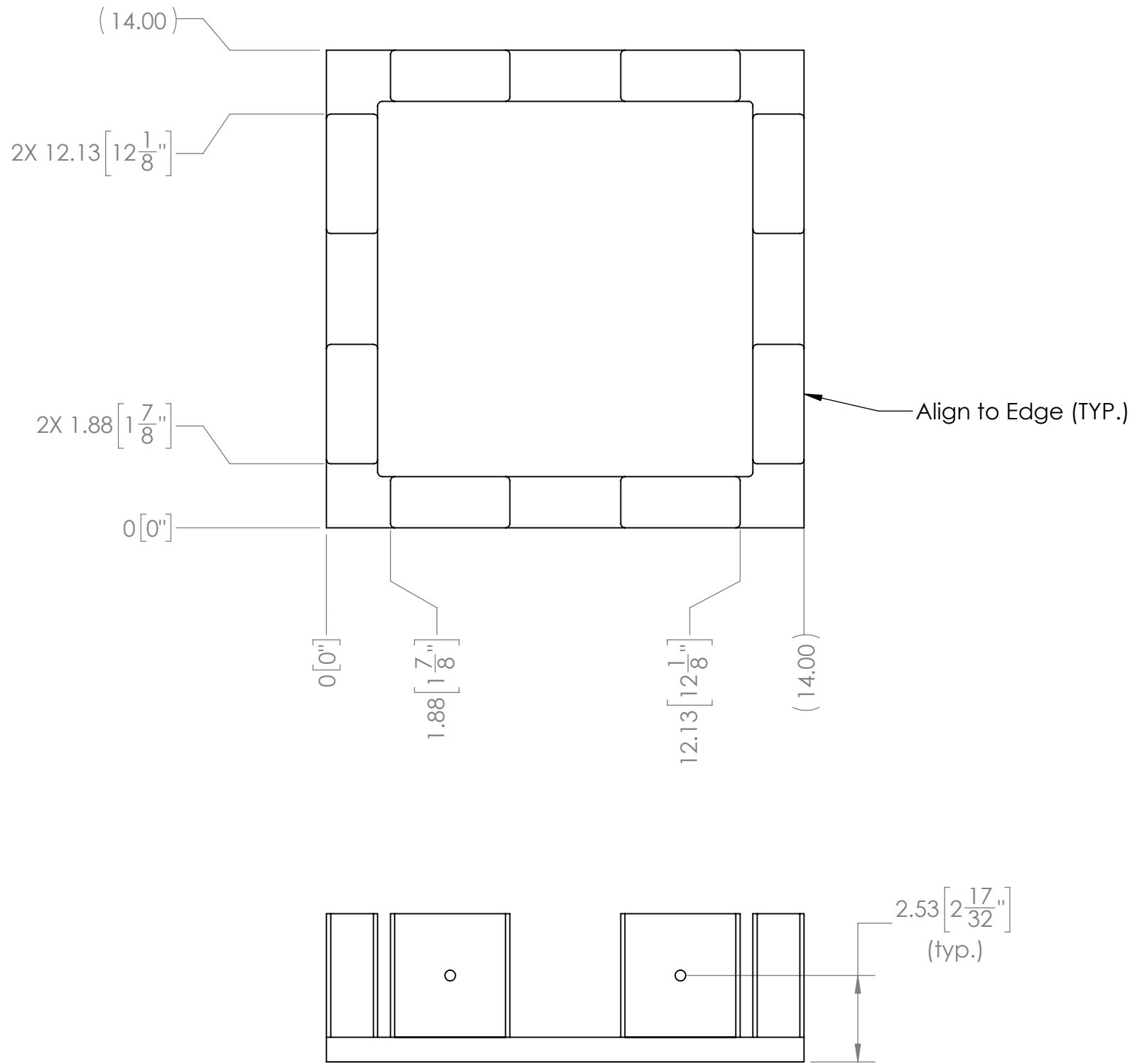
C

B

A

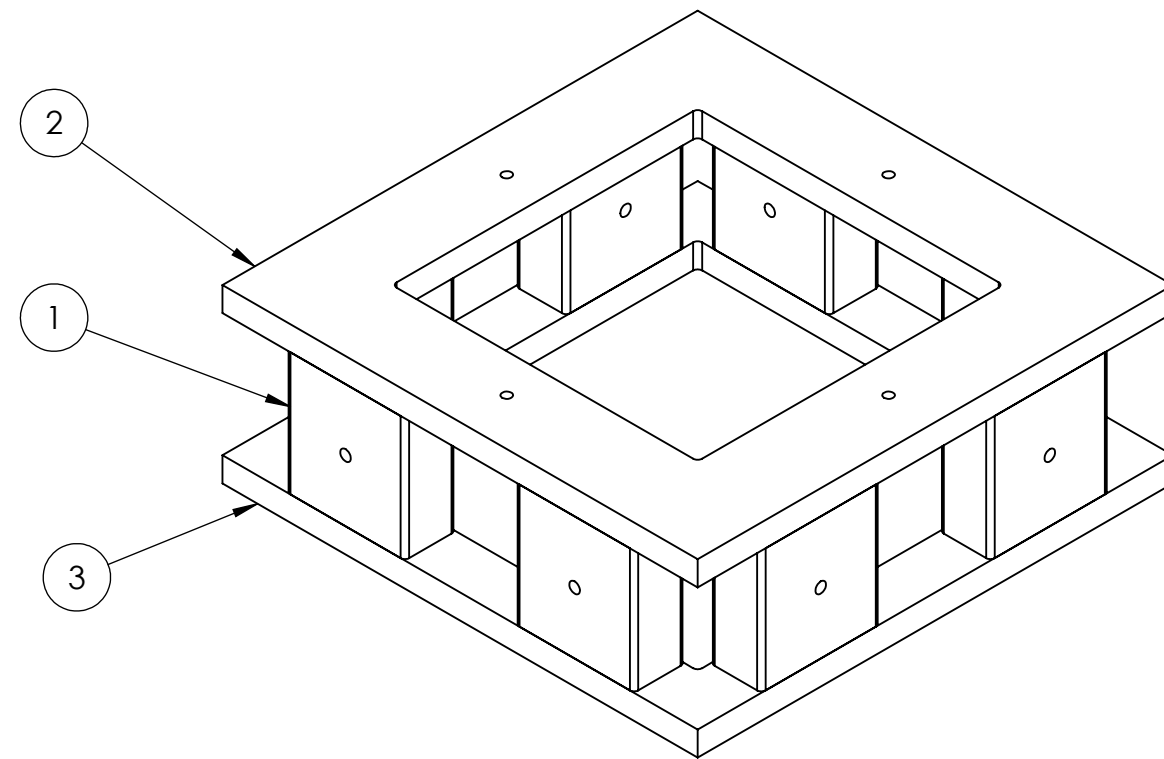
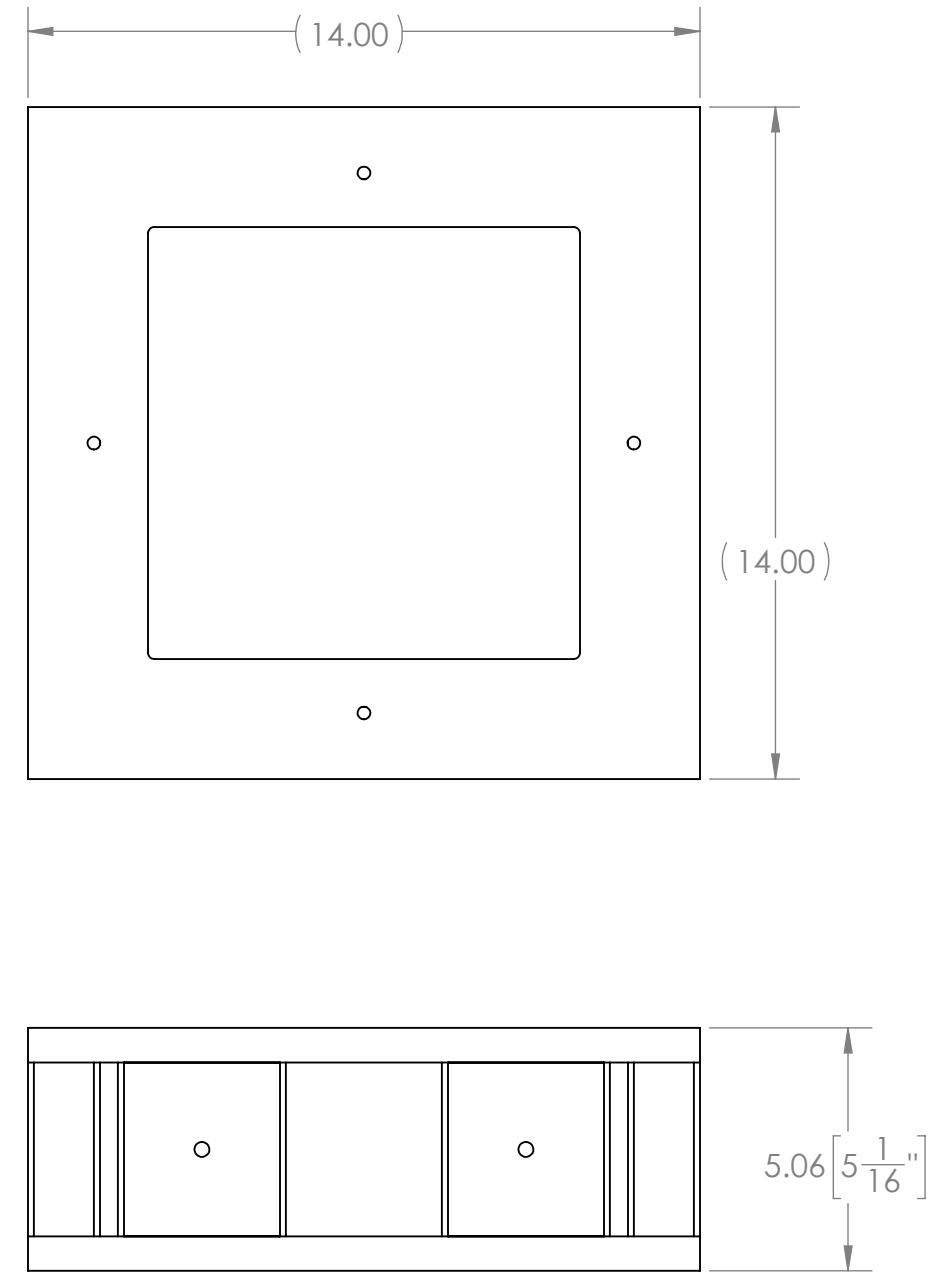
Step 1



- Align 8x (1) on (3) , as shown.
- Connect using 2" long screws. It is recommended to use 2x screws into each (1) .



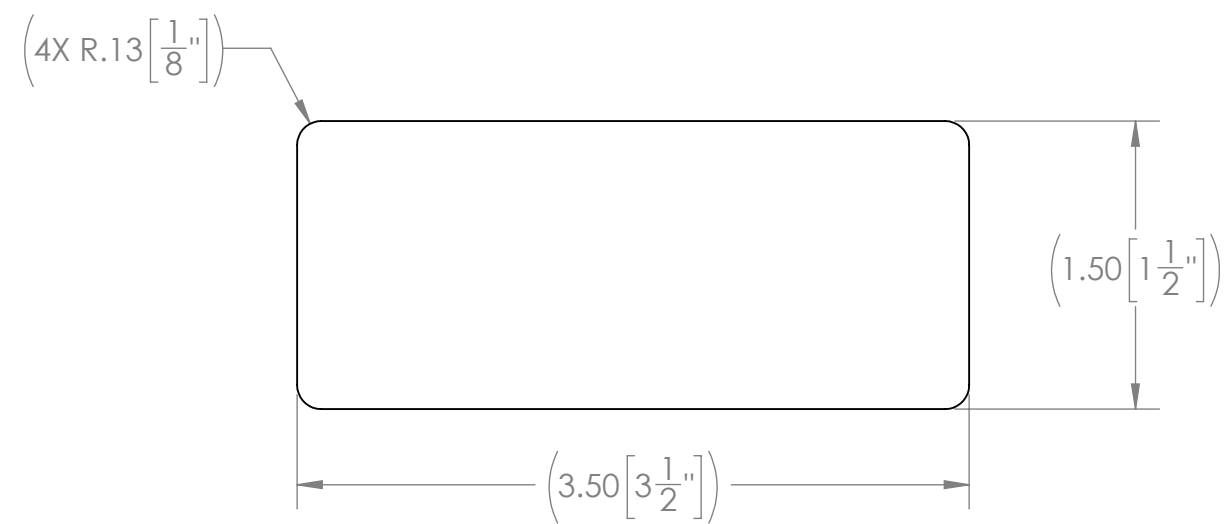
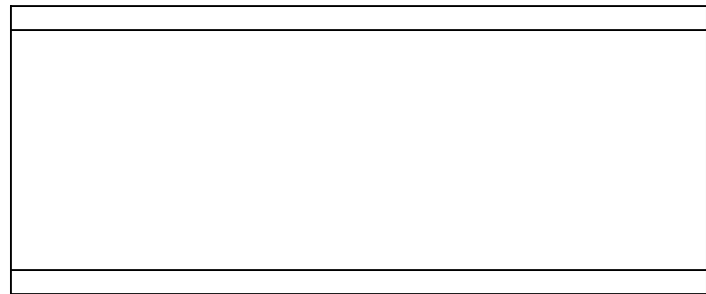
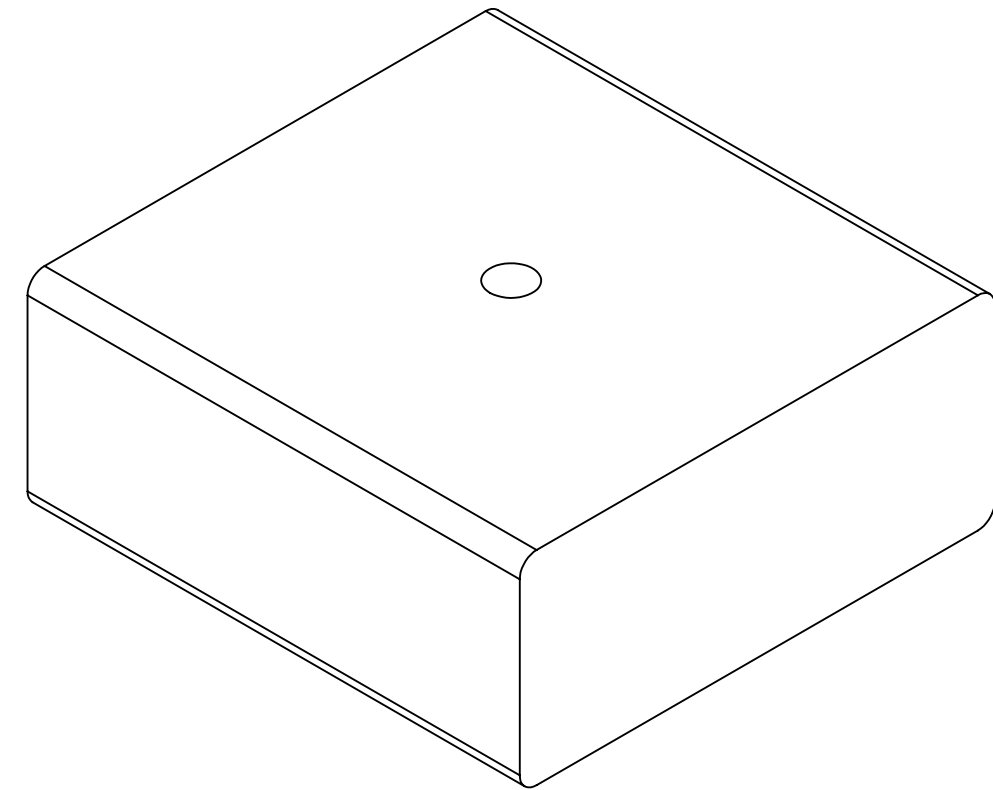
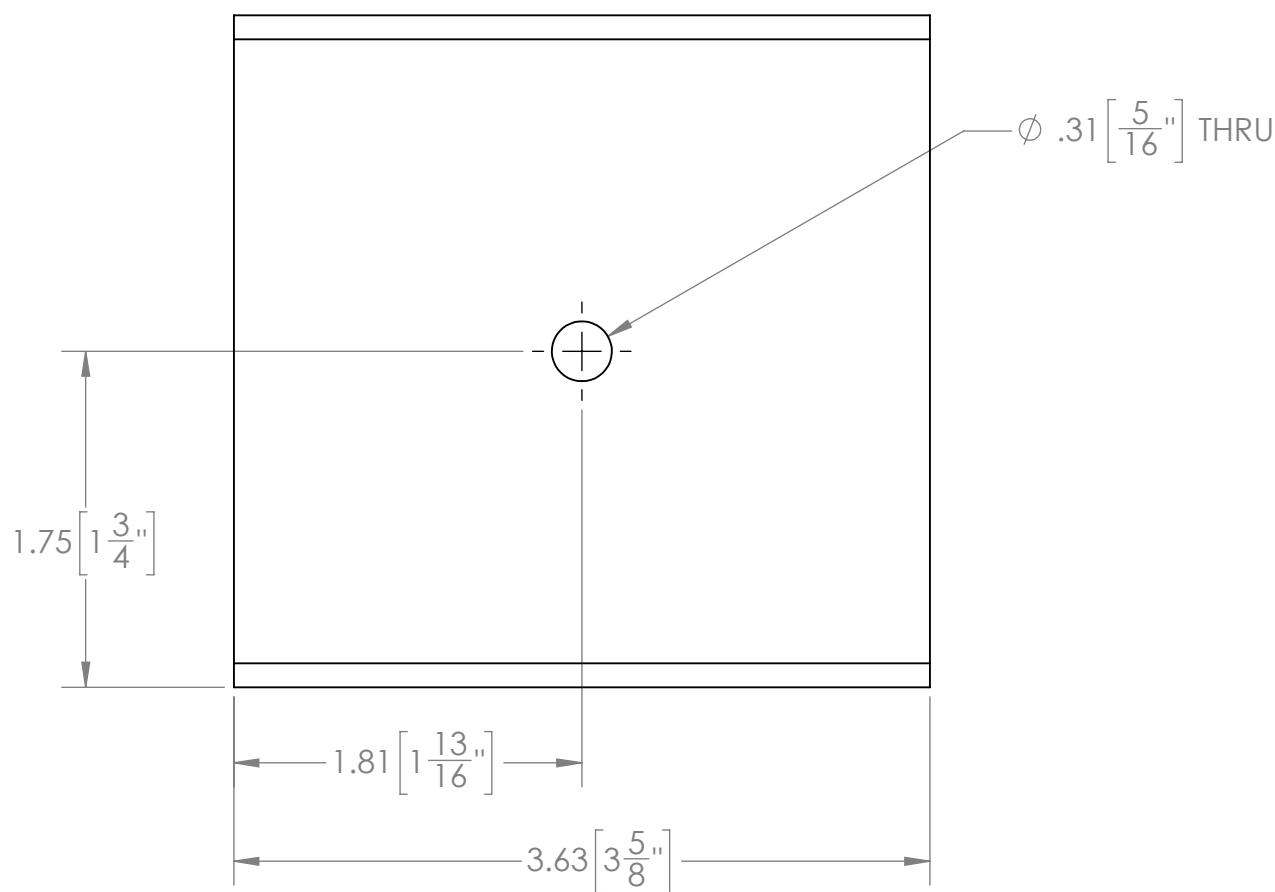
Step 2

- Align (2) to Step 1 as shown.
- Connect using 2" long screws. It is recommended to use 2x screws into each (1) .





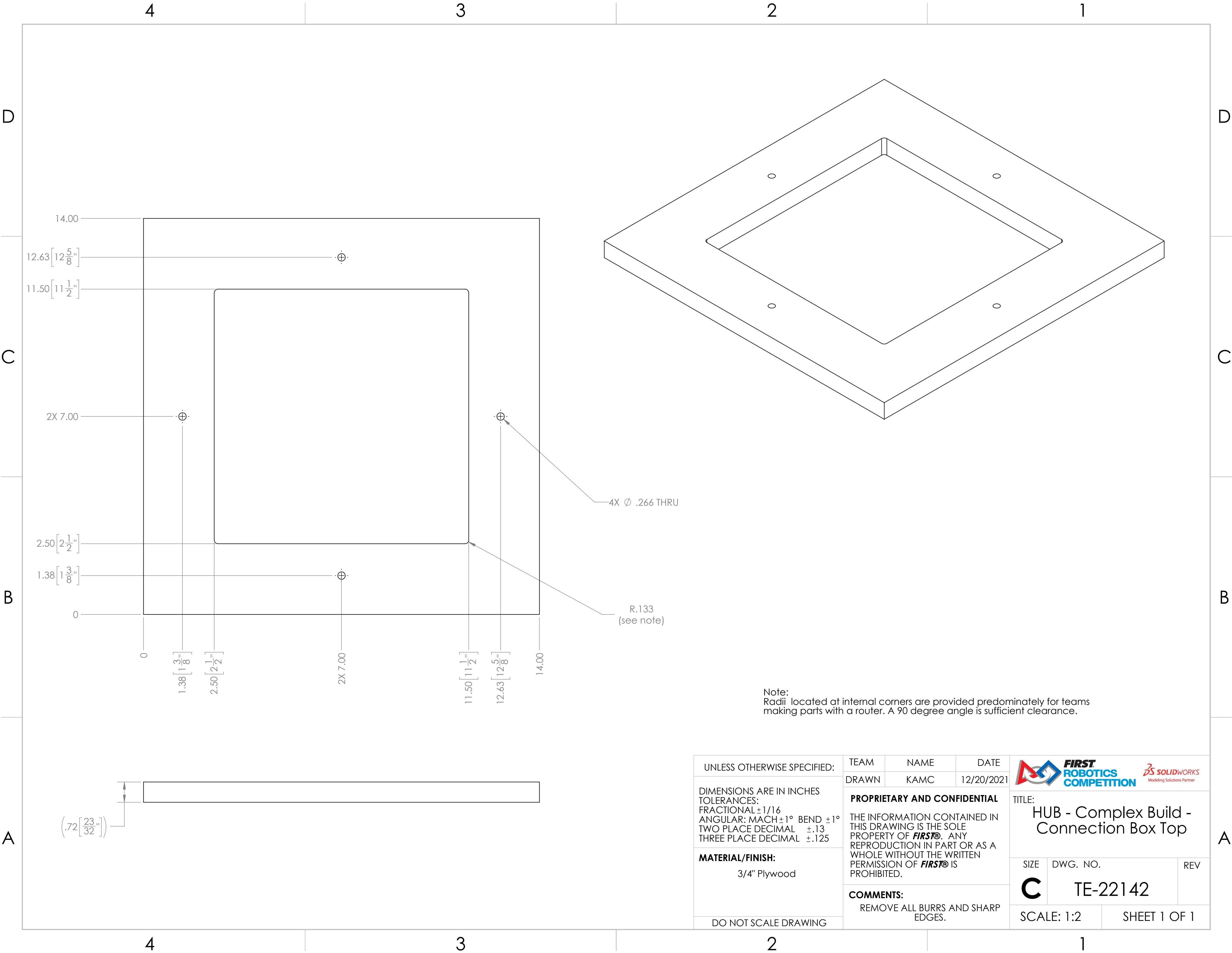
UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	 		
	DRAWN	KAMC	12/20/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	PROPRIETARY AND CONFIDENTIAL			TITLE:		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			HUB - Complex Build - Connection Box Assembly		
MATERIAL/FINISH:	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
				C	TE-22140	
DO NOT SCALE DRAWING				SCALE: 1:4		SHEET 3 OF 3





Note:  
Use TE-22141-AM if pairing with AndyMark Upper Hub (AM-4671)



UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  2" x 4" Lumber  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div><div></div><div>TITLE: HUB - Complex Build - Connection Box 2x4</div></div>		
	DRAWN	KAMC	12/20/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
			C	TE-22141		
			SCALE: 1:1		SHEET 1 OF 1	

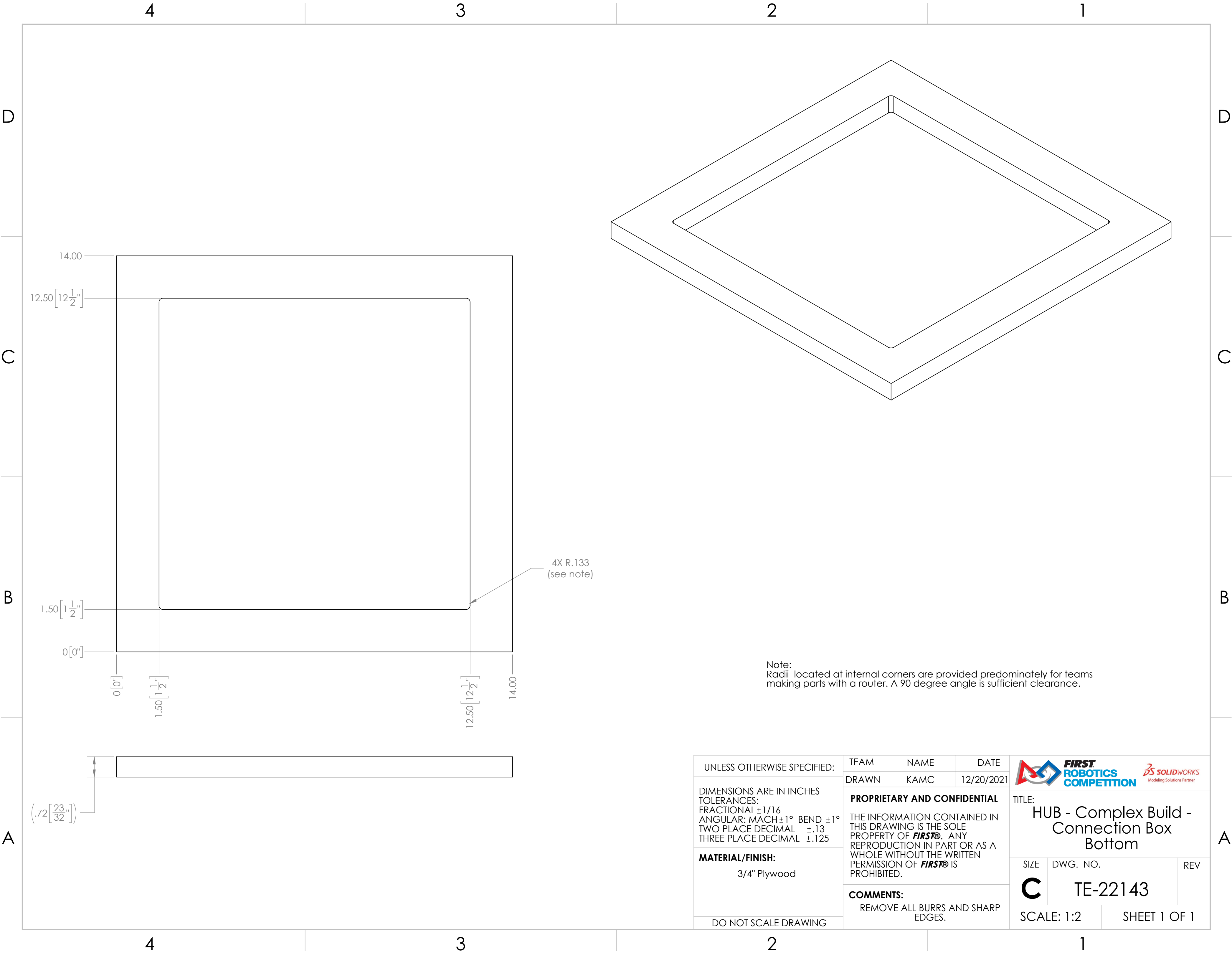




4X Ø .266 THRU

R.133  
(see note)

Note:  
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL    ±.13 THREE PLACE DECIMAL   ±.125  <b>MATERIAL/FINISH:</b>  3/4" Plywood  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div> <div>TITLE: HUB - Complex Build - Connection Box Top</div>		
	DRAWN	KAMC	12/20/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE	DWG. NO.	REV
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			C	TE-22142	
SCALE: 1:2			SHEET 1 OF 1			



UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  3/4" Plywood   DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	KAMC	12/20/2021		
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			TITLE:  HUB - Complex Build - Connection Box Bottom	
			SIZE	DWG. NO.	REV
			C	TE-22143	
			SCALE: 1:2		SHEET 1 OF 1



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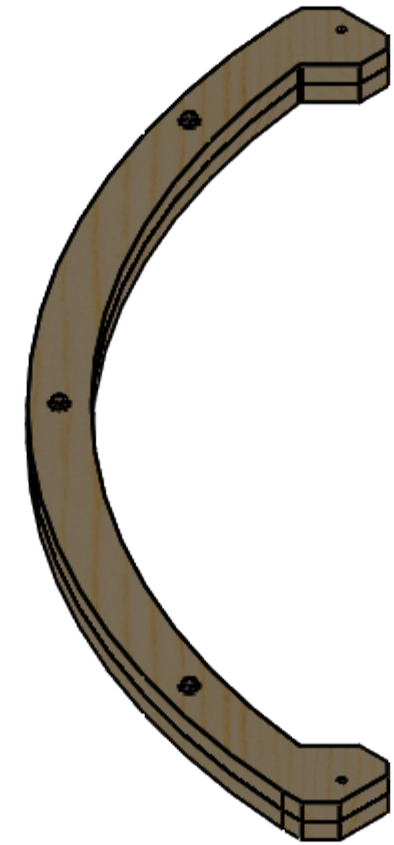
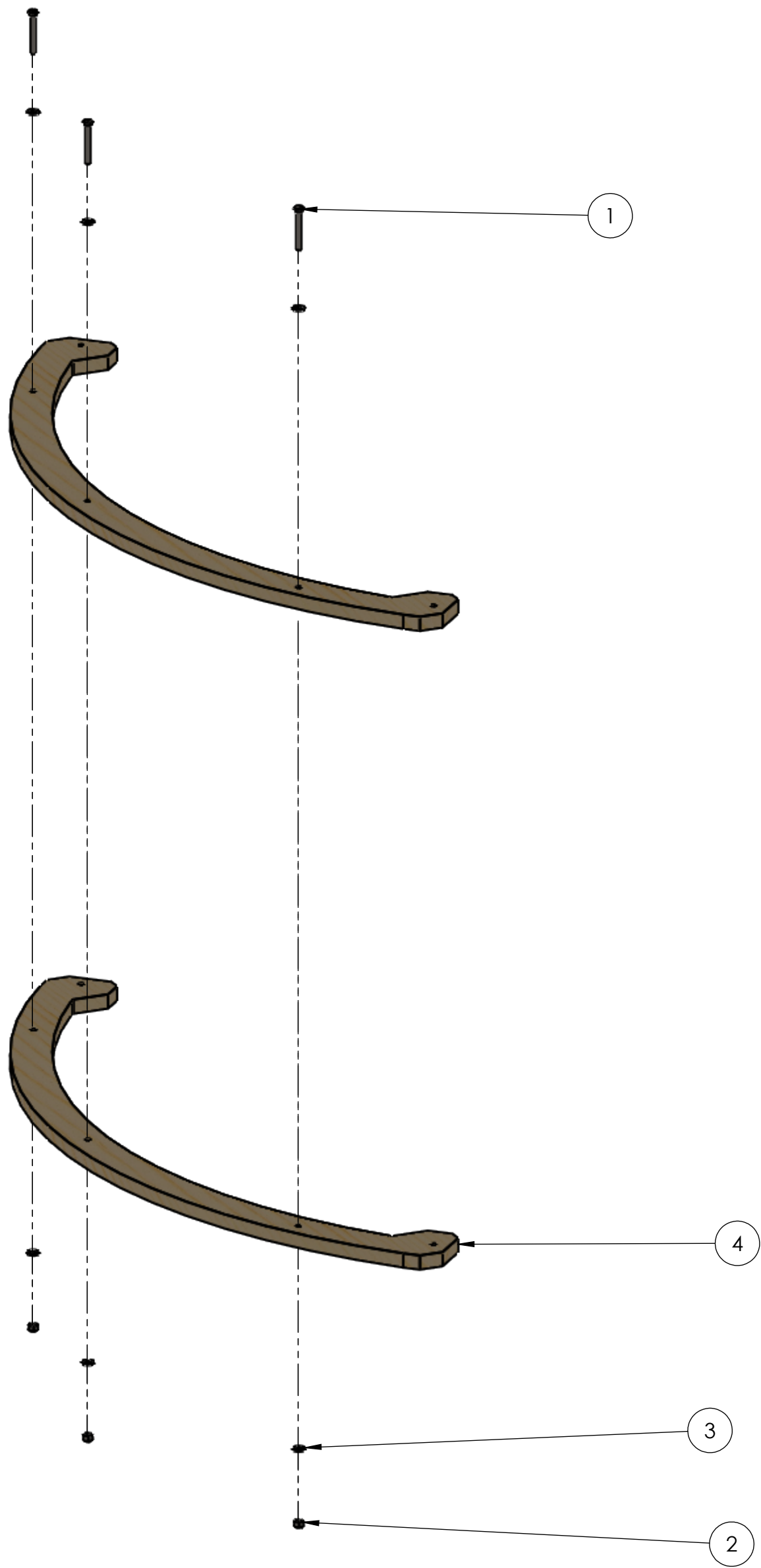
A

D

C



B

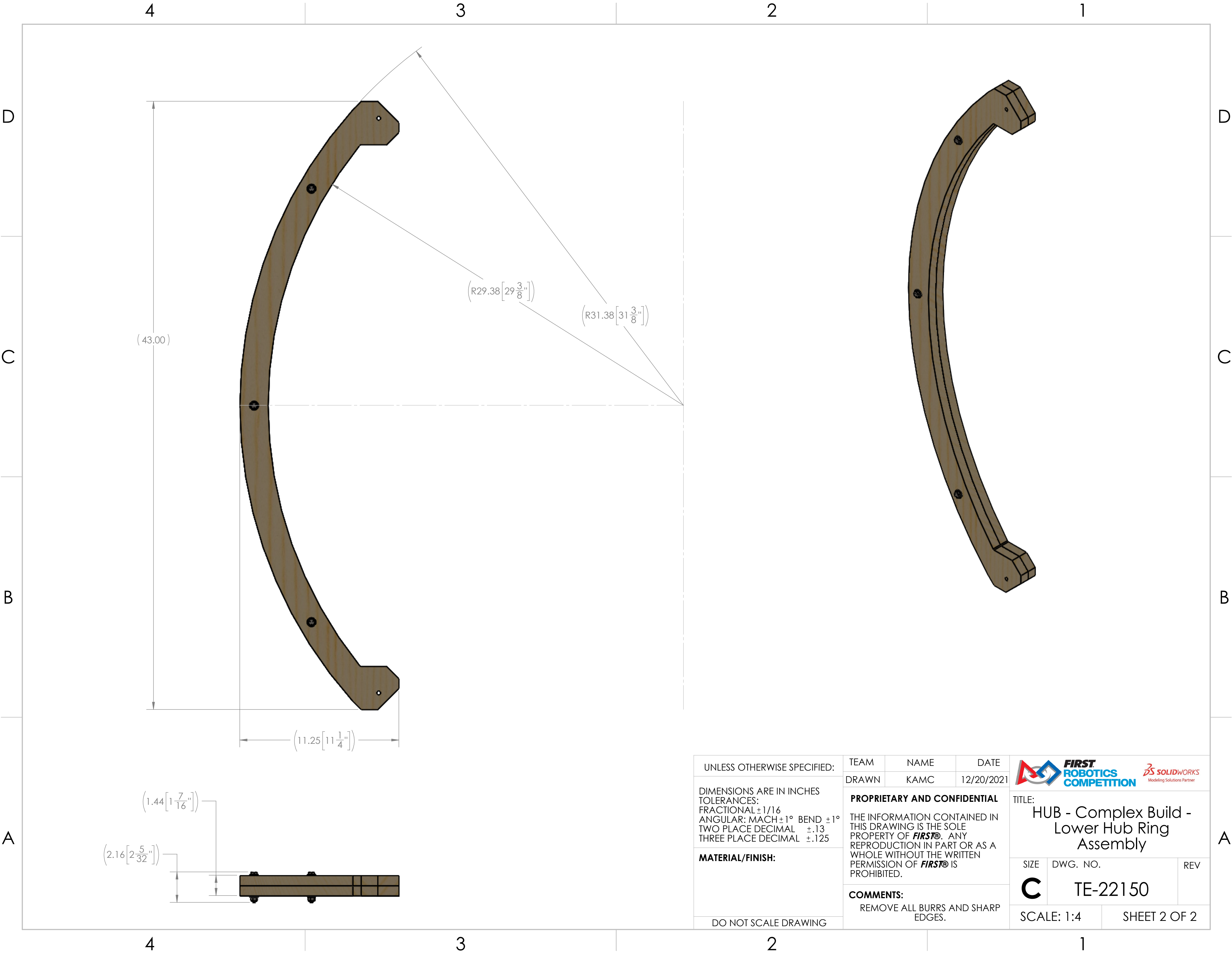
A





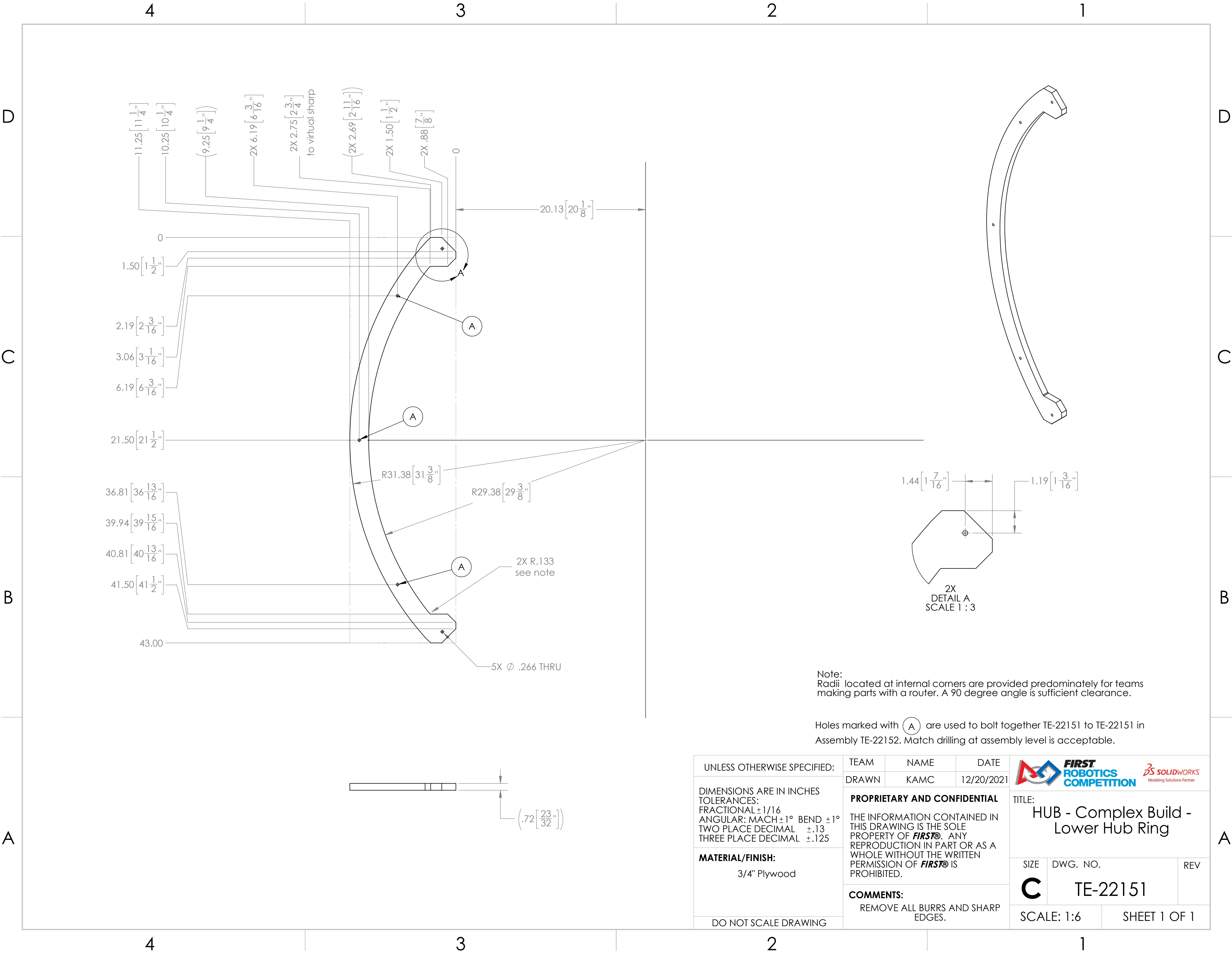
- Step 1
1. Align 2x (4) to each other.
- Step 2:
2. Connect Step 1 using the center 3 holes in (4) . Use 1x (1) , 2x (4) , and 1x (2) per hole.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	hex_.25_20_2	Steel Hex Head Screw, 1/4"-20 x 2" long, fully threaded	3
2	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	3
3	washer_flat_.25	Flat Washer for 1/4" Screw	6
4	TE-22151	HUB - Complex Build - Lower Hub Ring	2

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>     DO NOT SCALE DRAWING	TEAM DRAWN	NAME KAMC	DATE 12/20/2021	 		
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE: <b>HUB - Complex Build - Lower Hub Ring Assembly</b>		
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE <b>C</b>	DWG. NO. <b>TE-22150</b>	REV
				SCALE: 1:6		SHEET 1 OF 2





UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>    DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	KAMC	12/20/2021		
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE: HUB - Complex Build - Lower Hub Ring Assembly	
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.
C				TE-22150	
			SCALE: 1:4		SHEET 2 OF 2

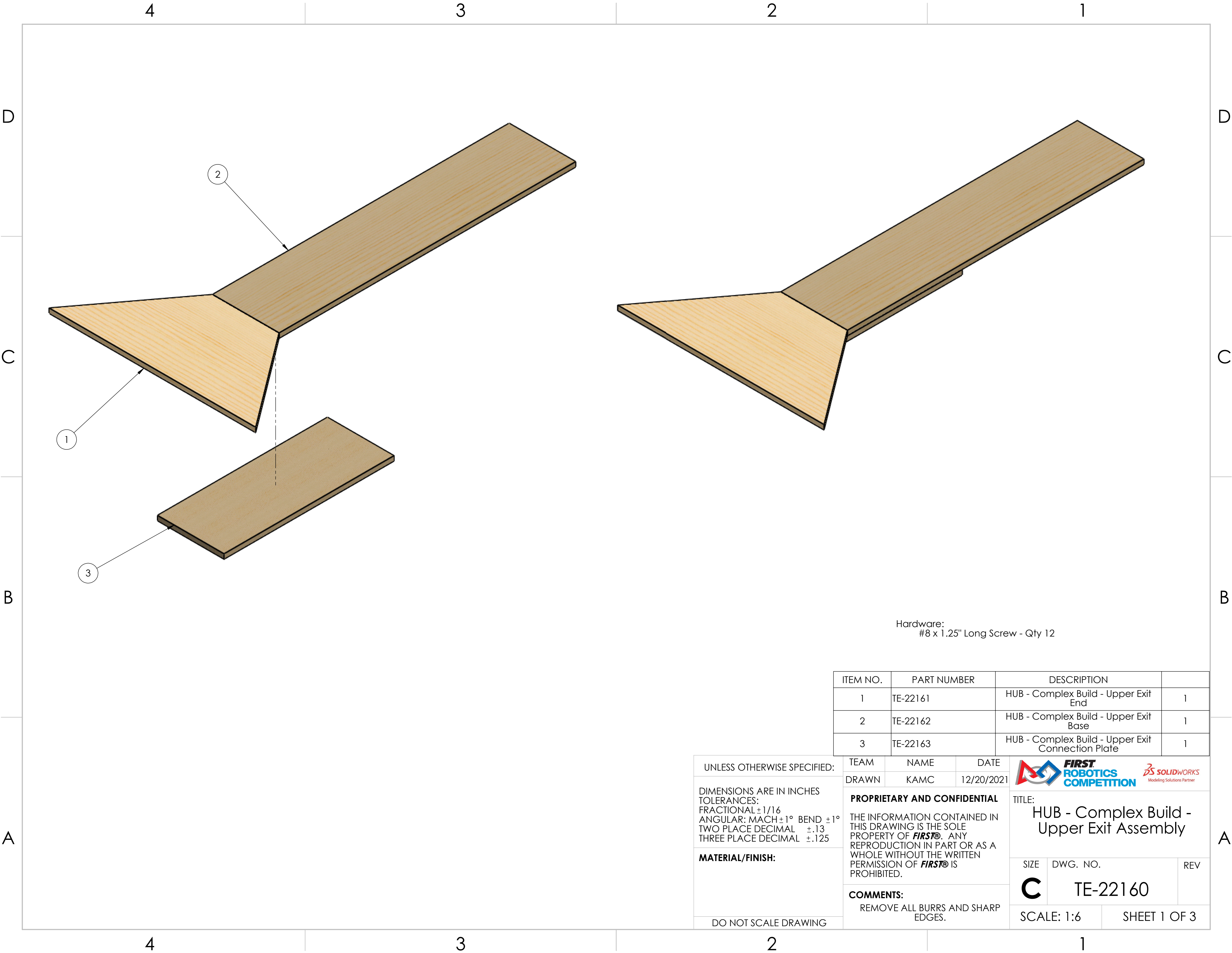


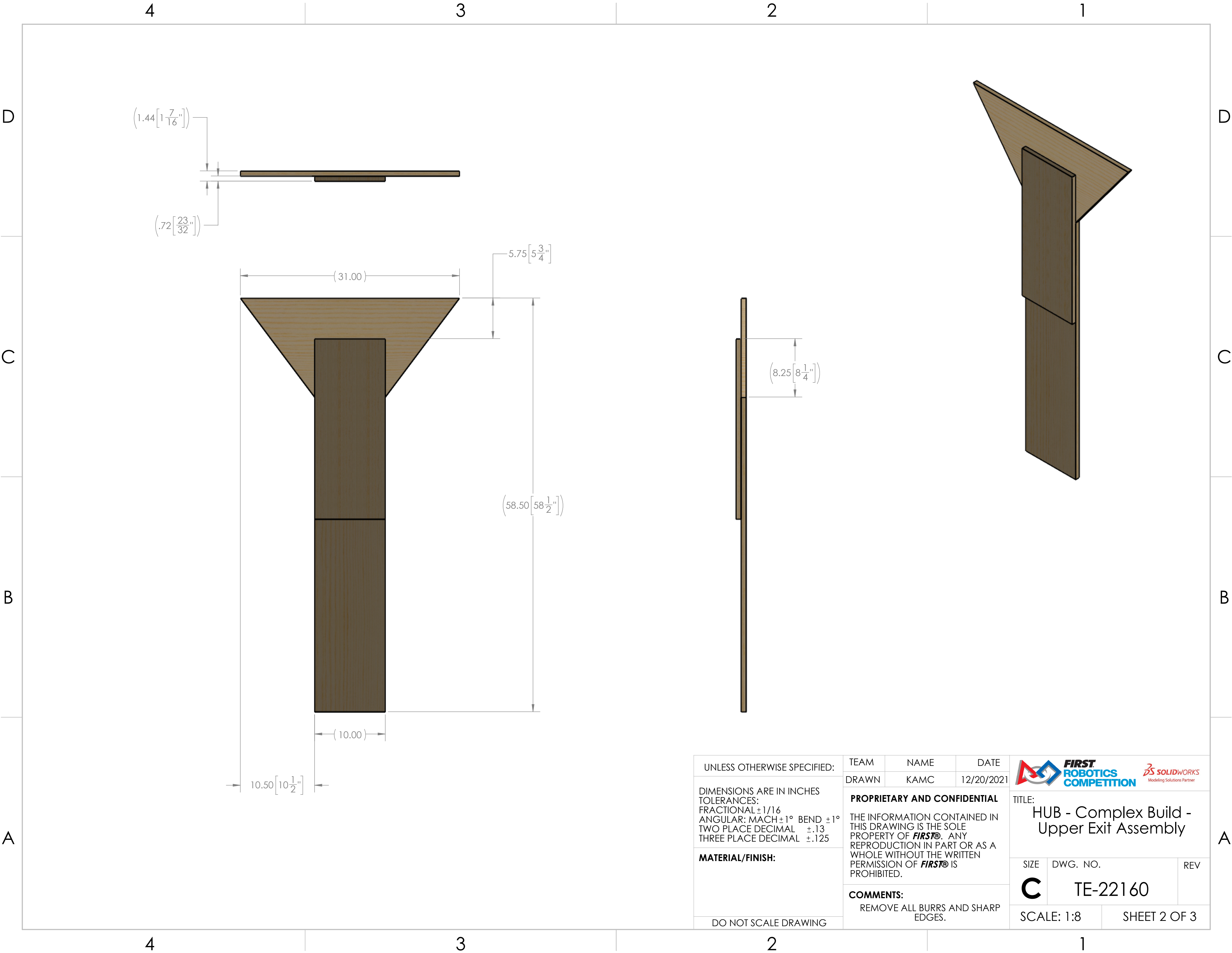
Note:  
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.



Holes marked with (A) are used to bolt together TE-22151 to TE-22151 in Assembly TE-22152. Match drilling at assembly level is acceptable.

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  3/4" Plywood  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/20/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE:  HUB - Complex Build - Lower Hub Ring		
	<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
C				TE-22151		
			SCALE: 1:6		SHEET 1 OF 1	







UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>          DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/20/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>			TITLE: HUB - Complex Build - Upper Exit Assembly		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE <b>C</b>	DWG. NO. TE-22160	REV
<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SCALE: 1:8		SHEET 2 OF 3	

1

D

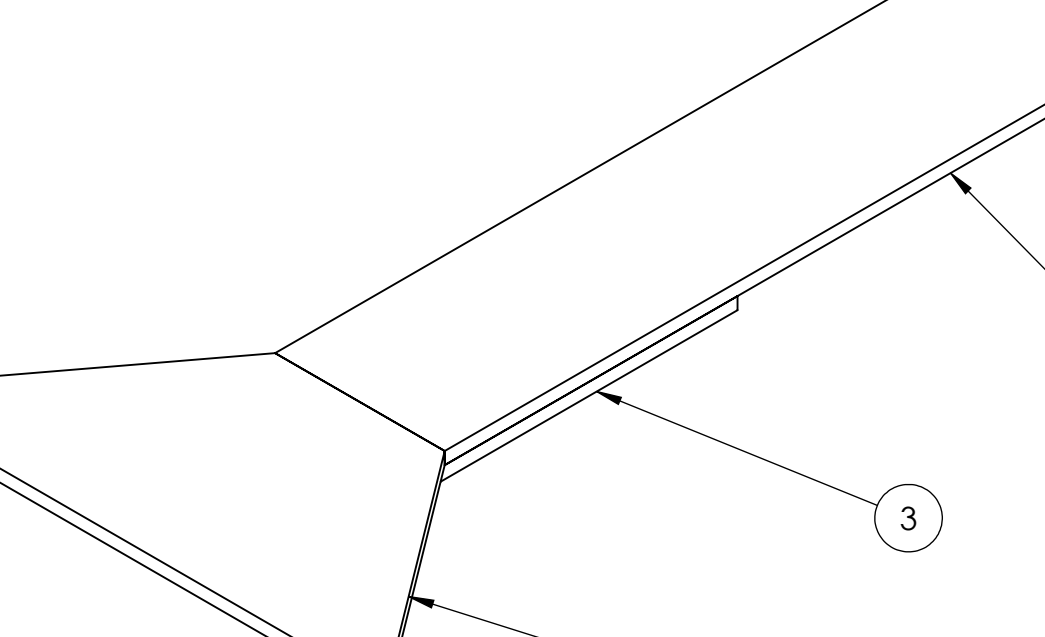
C

B

A

### Top View

- 



A 3D perspective view of a bent plate. The plate is shown in a bent configuration, with three labels (1, 2, and 3) pointing to different regions of the plate. Label 1 points to the bottom edge of the left flange. Label 2 points to the top edge of the right flange. Label 3 points to the top edge of the central web.

- SHEET 3 OF 3

1



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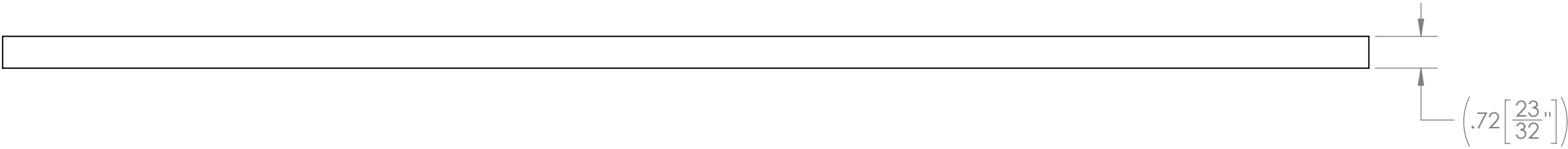
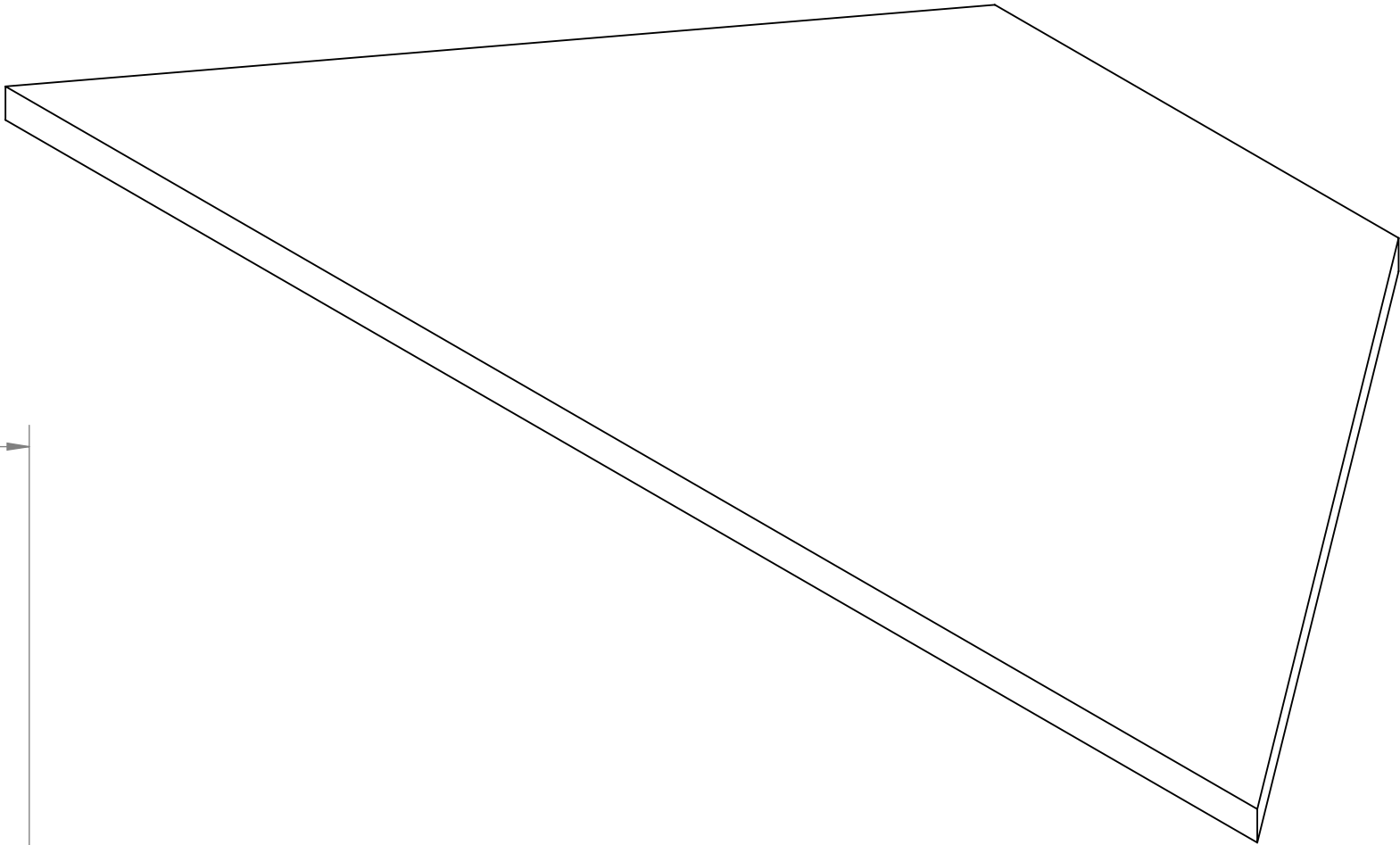
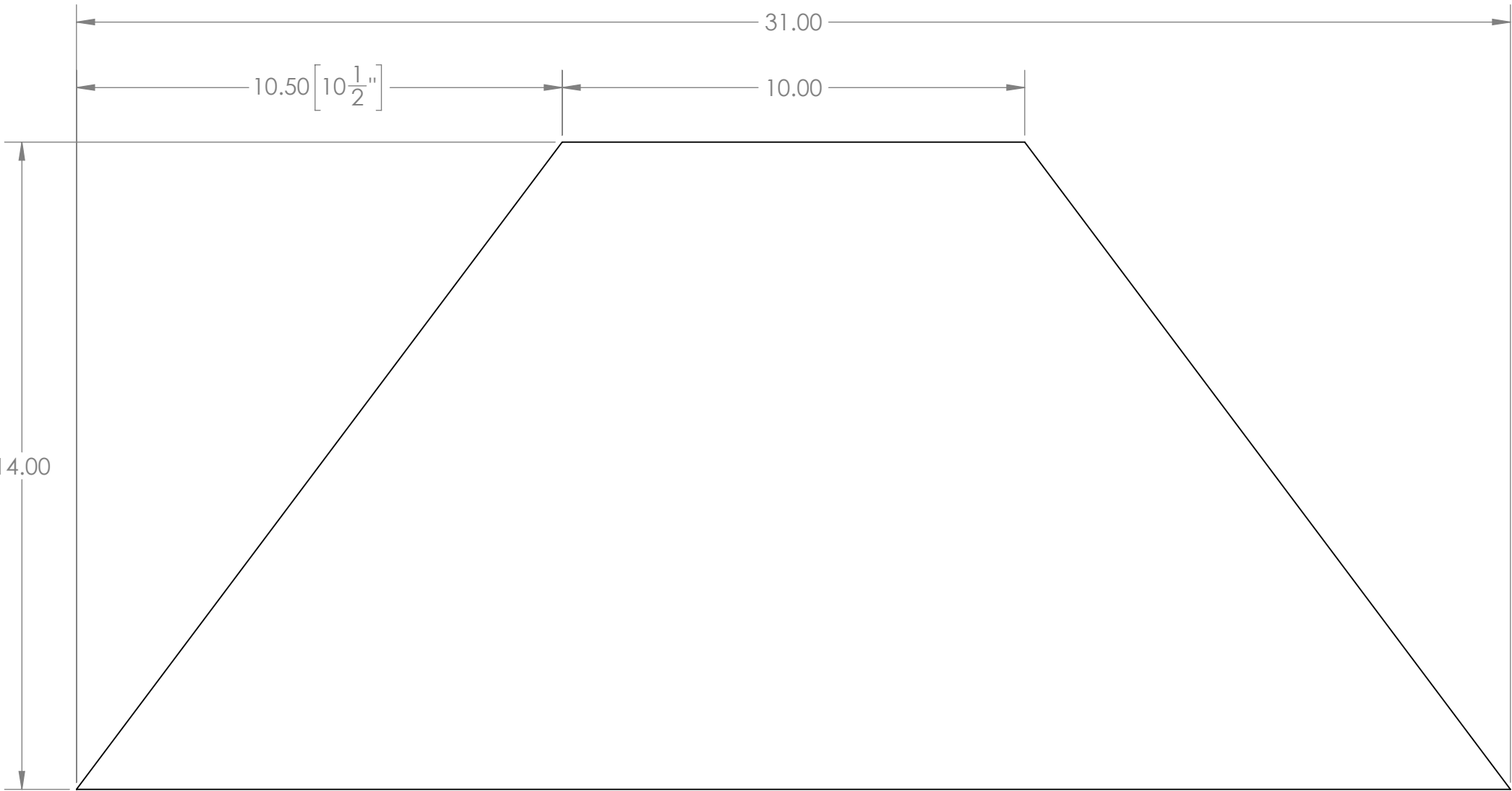
A



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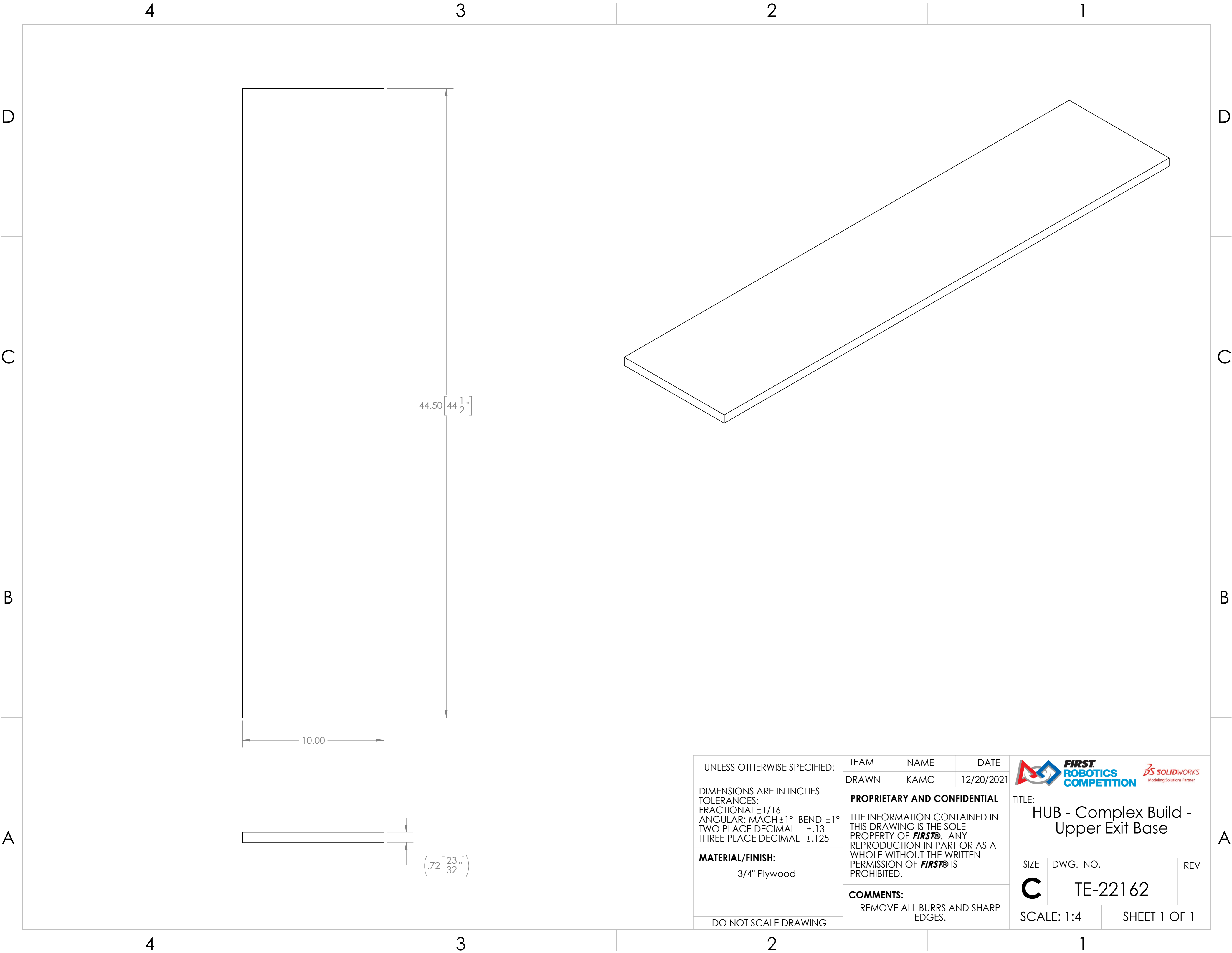
C



B

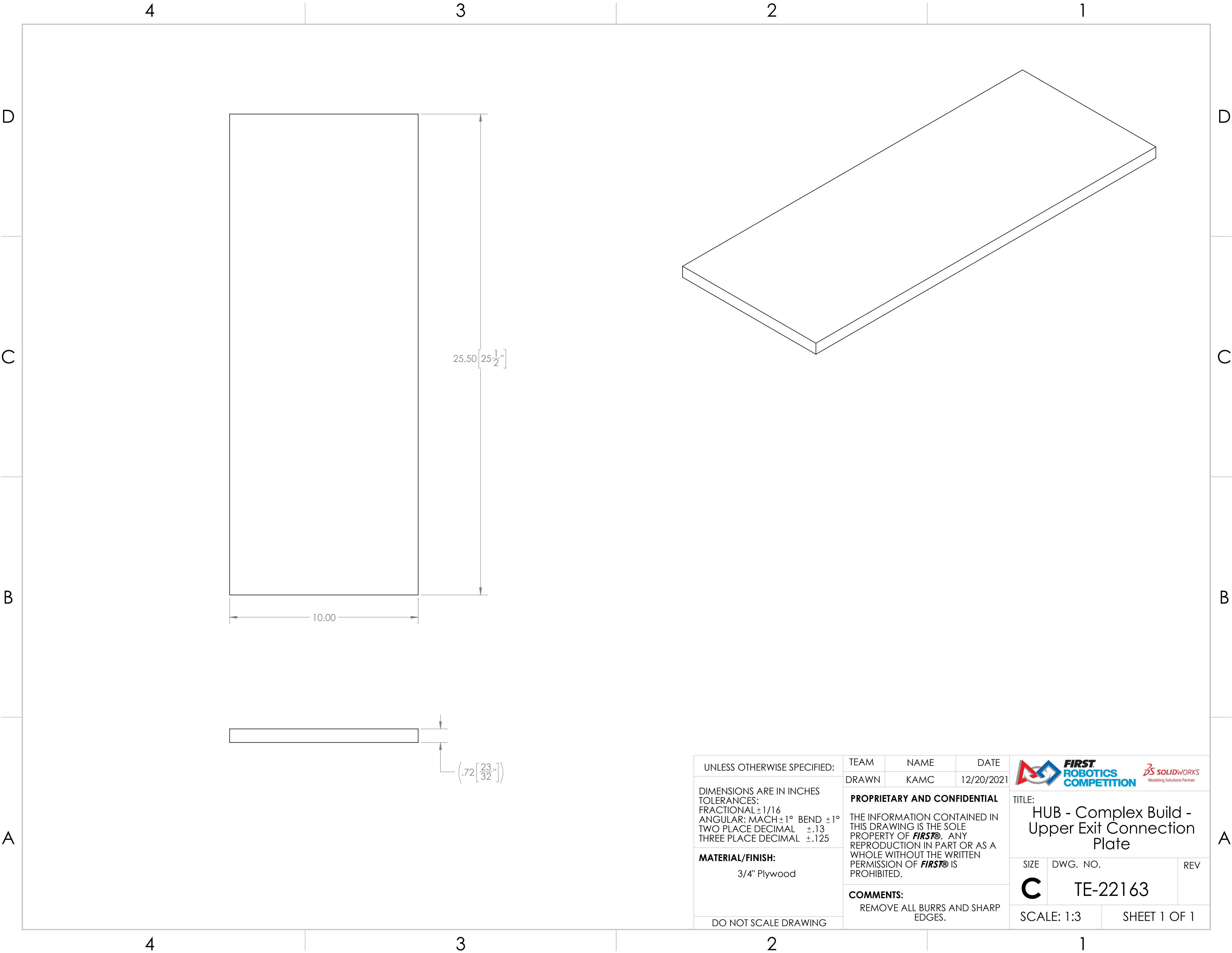
A





UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div> <div>TITLE: HUB - Complex Build - Upper Exit End</div>		
	DRAWN	KAMC	12/20/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE	DWG. NO.	REV
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			C	TE-22161	
SCALE: 1:3				SHEET 1 OF 1		
MATERIAL/FINISH:  3/4" Plywood						
DO NOT SCALE DRAWING						



UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/20/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>			TITLE: HUB - Complex Build - Upper Exit Base		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.					
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE <b>C</b>	DWG. NO. TE-22162	REV
<b>MATERIAL/FINISH:</b>  3/4" Plywood	DO NOT SCALE DRAWING			SCALE: 1:4		SHEET 1 OF 1



UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>  3/4" Plywood  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div> <div>TITLE: HUB - Complex Build - Upper Exit Connection Plate</div>		
	DRAWN	KAMC	12/20/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE	DWG. NO.	REV
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			<b>C</b>	TE-22163	
SCALE: 1:3		SHEET 1 OF 1				



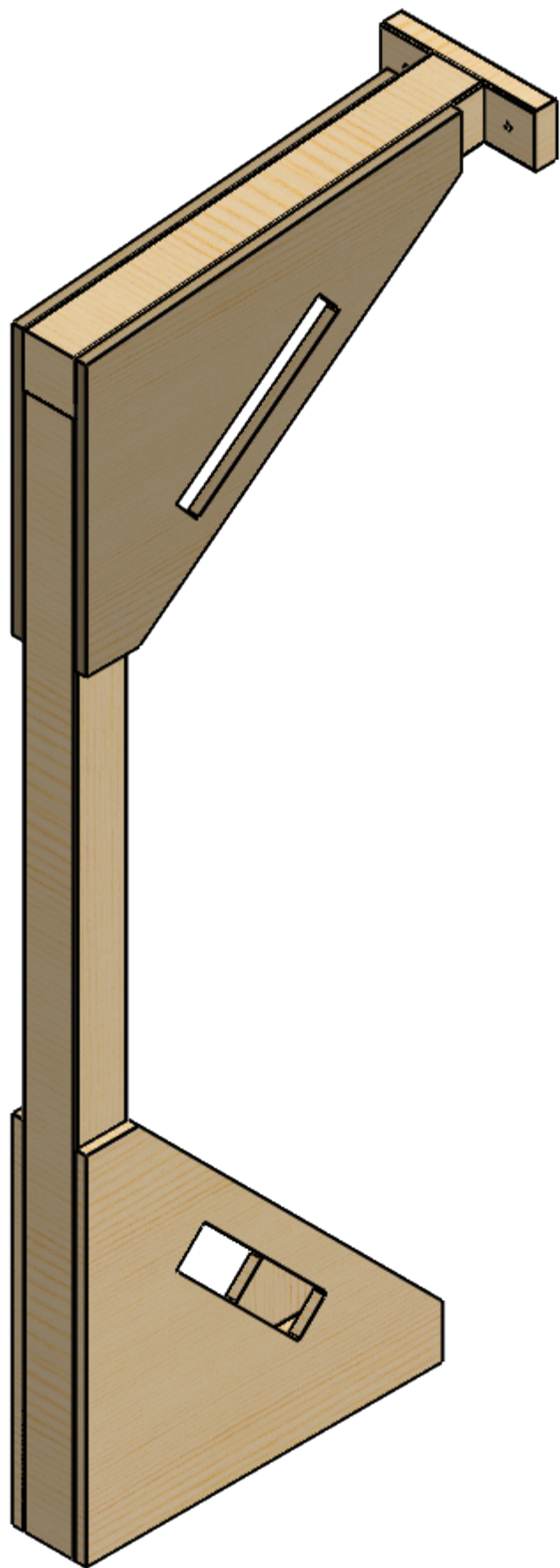
1

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22177	HUB - Complex Build - Lower Leg Assembly	1
2	TE-22178	HUB - Complex Build - Upper Leg Assembly	1

UNLESS OTHERWISE SPECIFIED:		TEAM		NAME		DATE	
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$		DRAWN		KAMC		12/21/2021	
		<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.					
		<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.					
DO NOT SCALE DRAWING							



**FIRST**  
ROBOTICS  
COMPETITION



**SOLIDWORKS**  
Modeling Solutions Partner

TITLE:  

HUB - Complex Build -  
Leg Assembly

SIZE

DWG. NO.

REV

C

TE-22170

SCALE: 1:8

SHEET 1 OF 2

D

C

B

A

D

C

B

A



(10.25 [10 1/4"])

(4.94 [4 15/16"])

(5°)

(28.71)

(71.77)

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div> <b>FIRST</b> ROBOTICS COMPETITION</div> <div> <b>SOLIDWORKS</b> Modeling Solutions Partner</div>		
	DRAWN	KAMC	12/21/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE:  HUB - Complex Build - Leg Assembly		
	<b>MATERIAL/FINISH:</b>			SIZE	DWG. NO.	REV
DO NOT SCALE DRAWING	<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.			C	TE-22170	
				SCALE: 1:10		SHEET 2 OF 2

4

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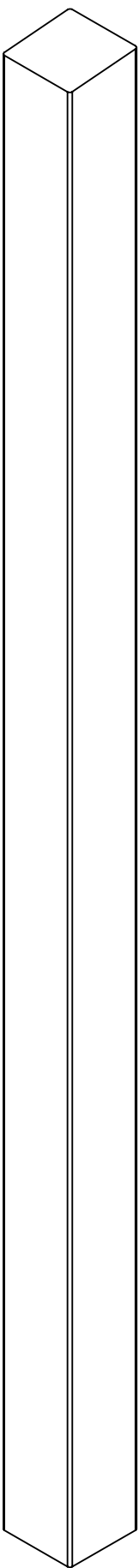
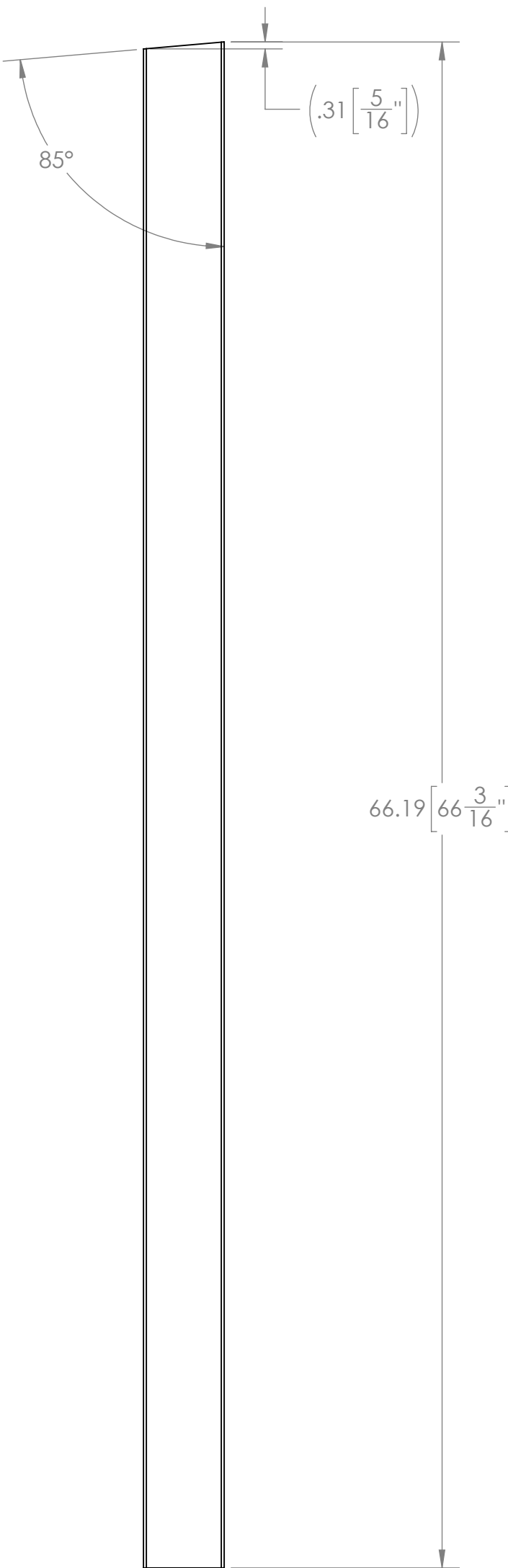
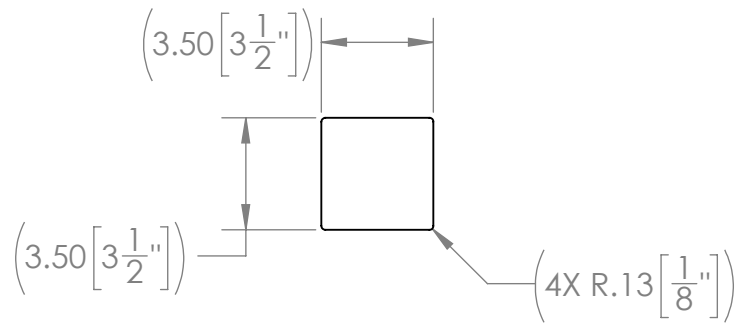
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UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>  4" x 4" Lumber  DO NOT SCALE DRAWING	TEAM	NAME	DATE	 TITLE: HUB - Complex Build - Lower Leg Vertical 4x4		
	DRAWN	KAMC	12/21/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE	DWG. NO.	REV
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			<b>C</b>	TE-22171	
SCALE: 1:6		SHEET 1 OF 1				

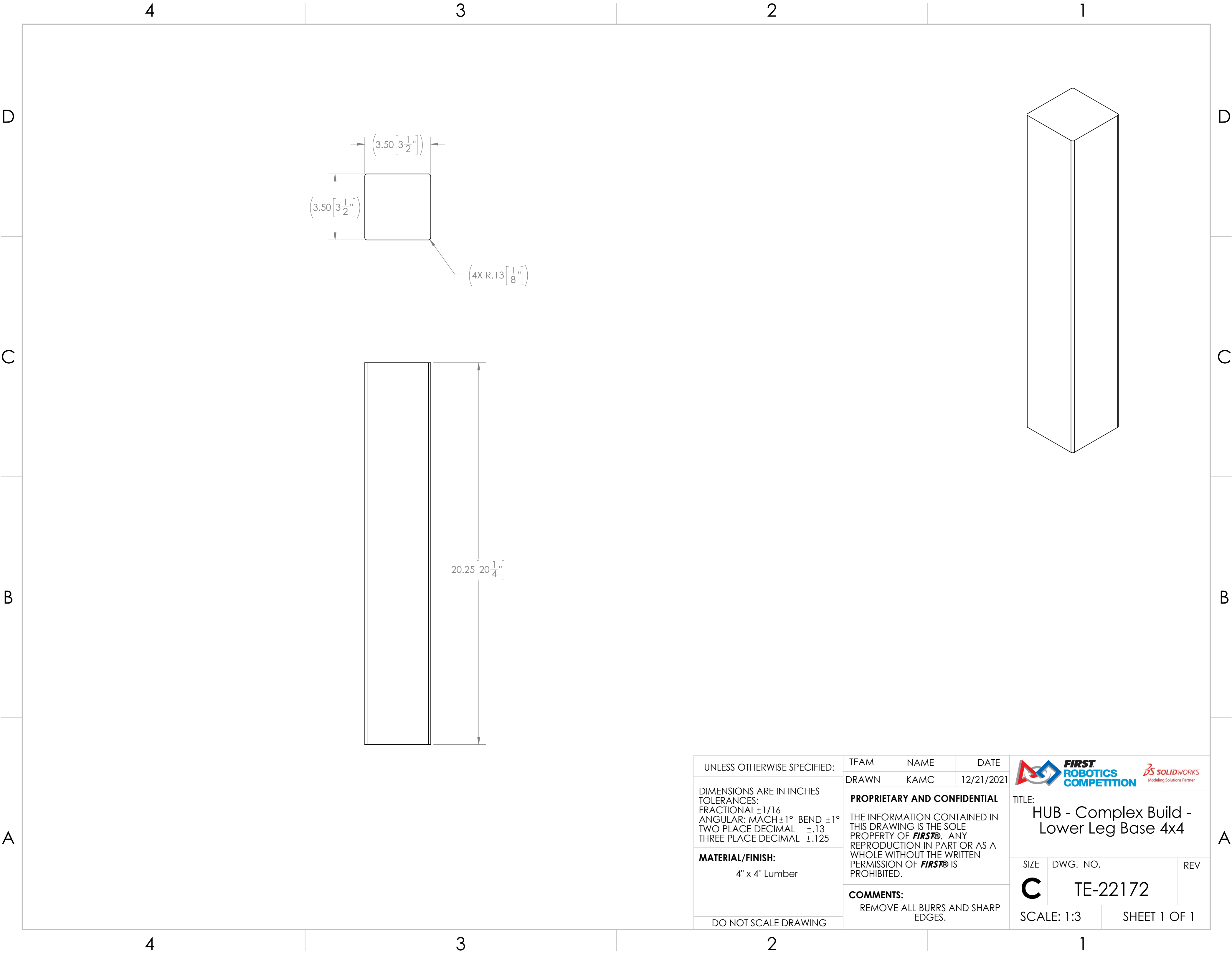
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3

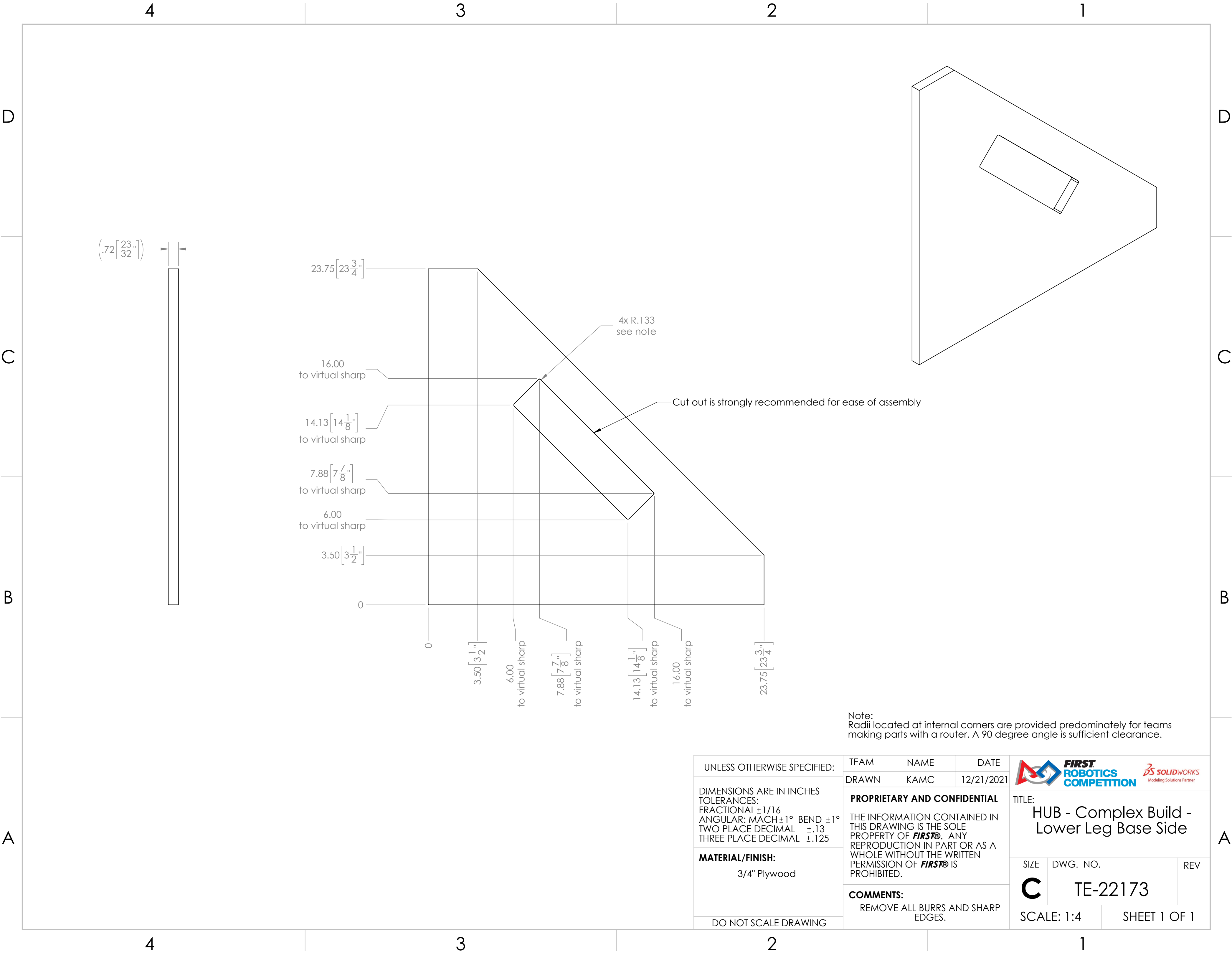
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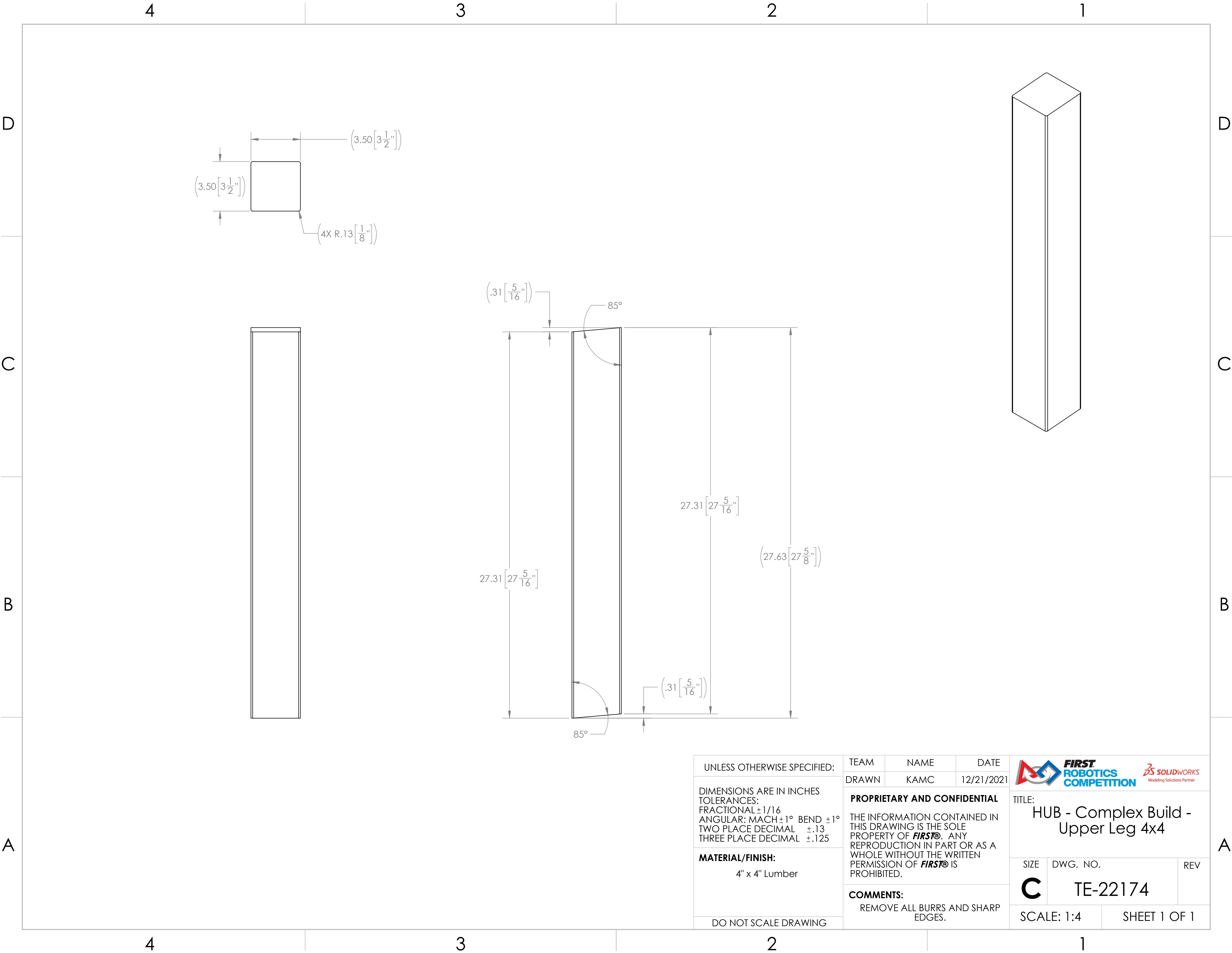
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UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  4" x 4" Lumber  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div> <div>TITLE: HUB - Complex Build - Lower Leg Base 4x4</div>		
	DRAWN	KAMC	12/21/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.					
SIZE		DWG. NO.		REV		
C		TE-22172				
SCALE: 1:3			SHEET 1 OF 1			





UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$

**MATERIAL/FINISH:**  
4" x 4" Lumber

DO NOT SCALE DRAWING

TEAM	NAME	DATE
DRAWN	KAMC	12/21/2021

**PROPRIETARY AND CONFIDENTIAL**

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**COMMENTS:**  
REMOVE ALL BURRS AND SHARP EDGES.

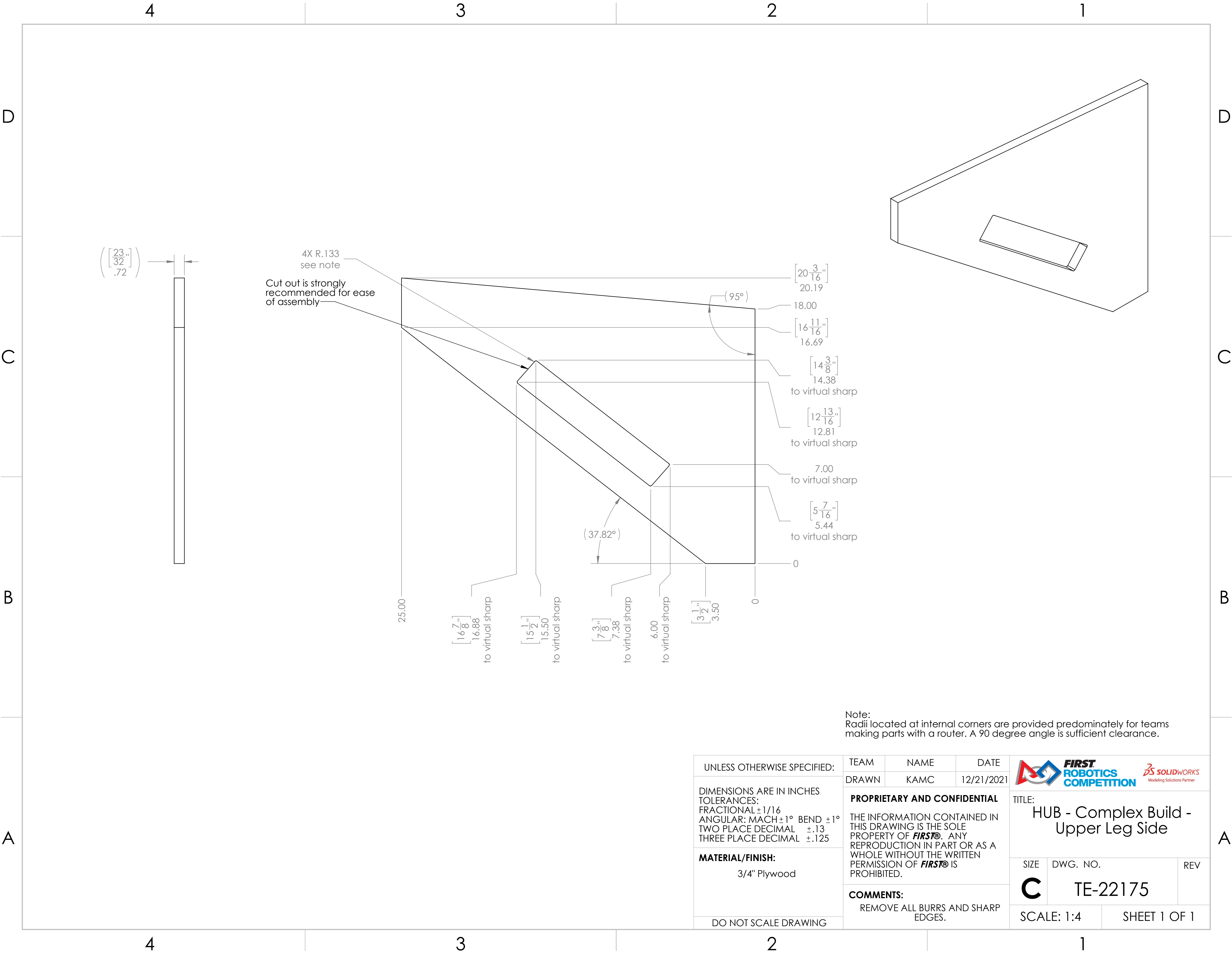


TITLE:  
**HUB - Complex Build - Upper Leg 4x4**

SIZE	DWG. NO.	REV
<b>C</b>	<b>TE-22174</b>	



SCALE: 1:4	SHEET 1 OF 1
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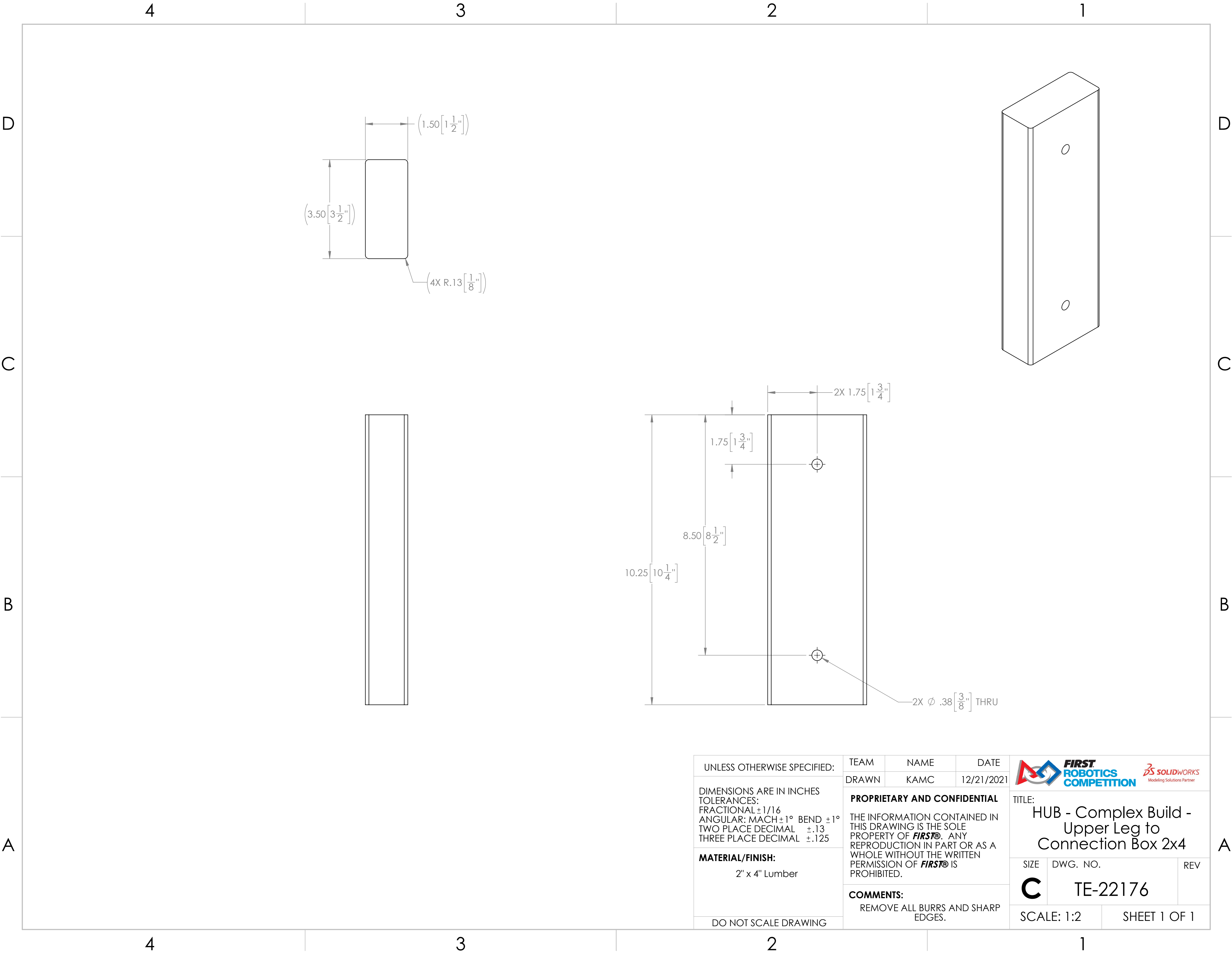






4X R.133  
see note  
Cut out is strongly  
recommended for ease  
of assembly

Note:  
Radii located at internal corners are provided predominately for teams  
making parts with a router. A 90 degree angle is sufficient clearance.

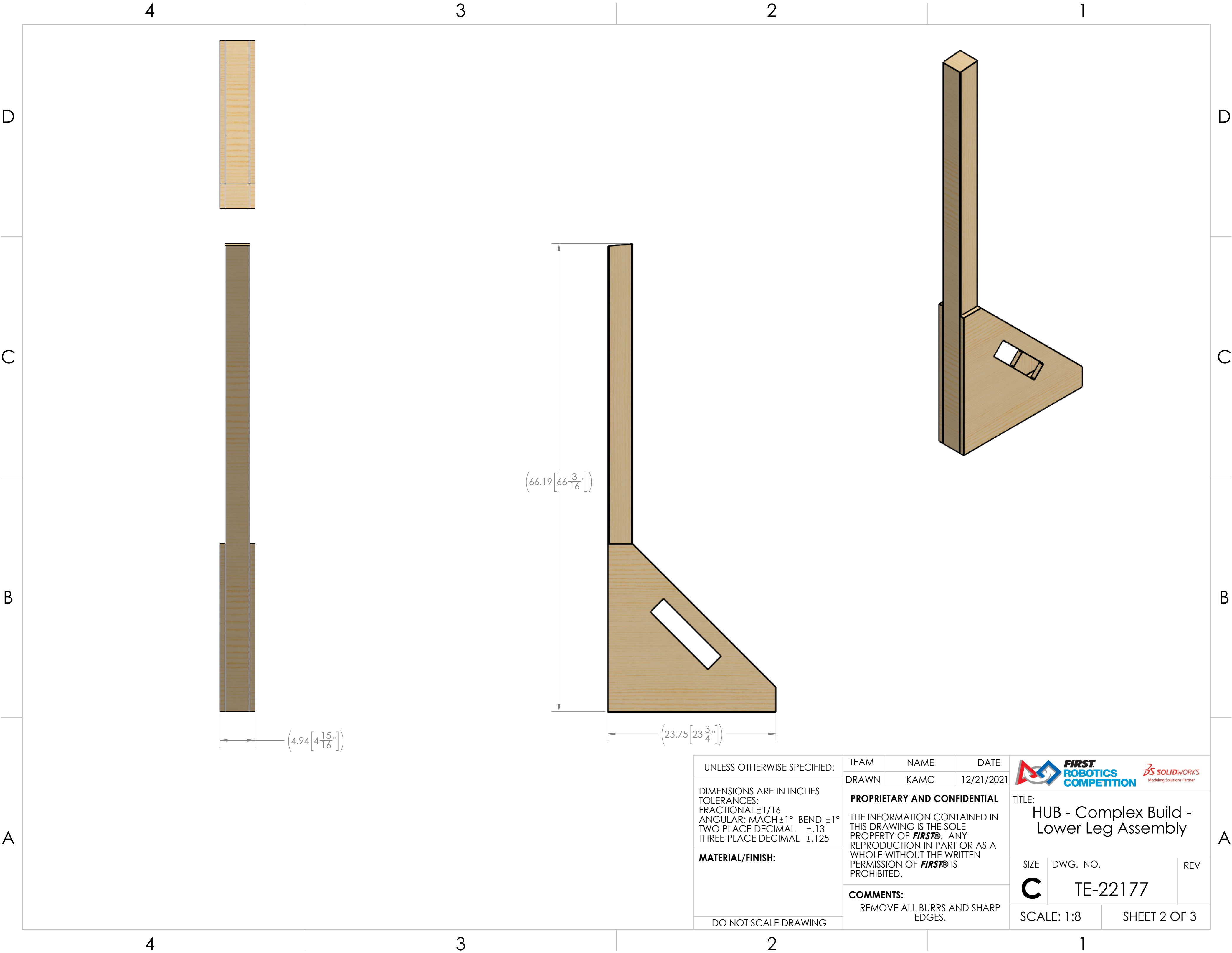
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	DRAWN	KAMC	12/21/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE	DWG. NO.	REV
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			<b>C</b>	TE-22175	
SCALE: 1:4		SHEET 1 OF 1				



UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  2" x 4" Lumber   DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div> <div>TITLE: HUB - Complex Build - Upper Leg to Connection Box 2x4</div>		
	DRAWN	KAMC	12/21/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.					
SIZE		DWG. NO.		REV		SCALE: 1:2
C		TE-22176				
				SHEET 1 OF 1		







UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$

**MATERIAL/FINISH:**

DO NOT SCALE DRAWING

TEAM

DRAWN

**PROPRIETARY AND CONFIDENTIAL**

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**COMMENTS:**

REMOVE ALL BURRS AND SHARP EDGES.

NAME

KAMC

DATE

12/21/2021



**FIRST**  
ROBOTICS  
COMPETITION

**SOLIDWORKS**  
Modeling Solutions Partner

TITLE:

HUB - Complex Build -  
Lower Leg Assembly

SIZE

**C**

DWG. NO.

TE-22177

REV

SCALE: 1:8

SHEET 2 OF 3

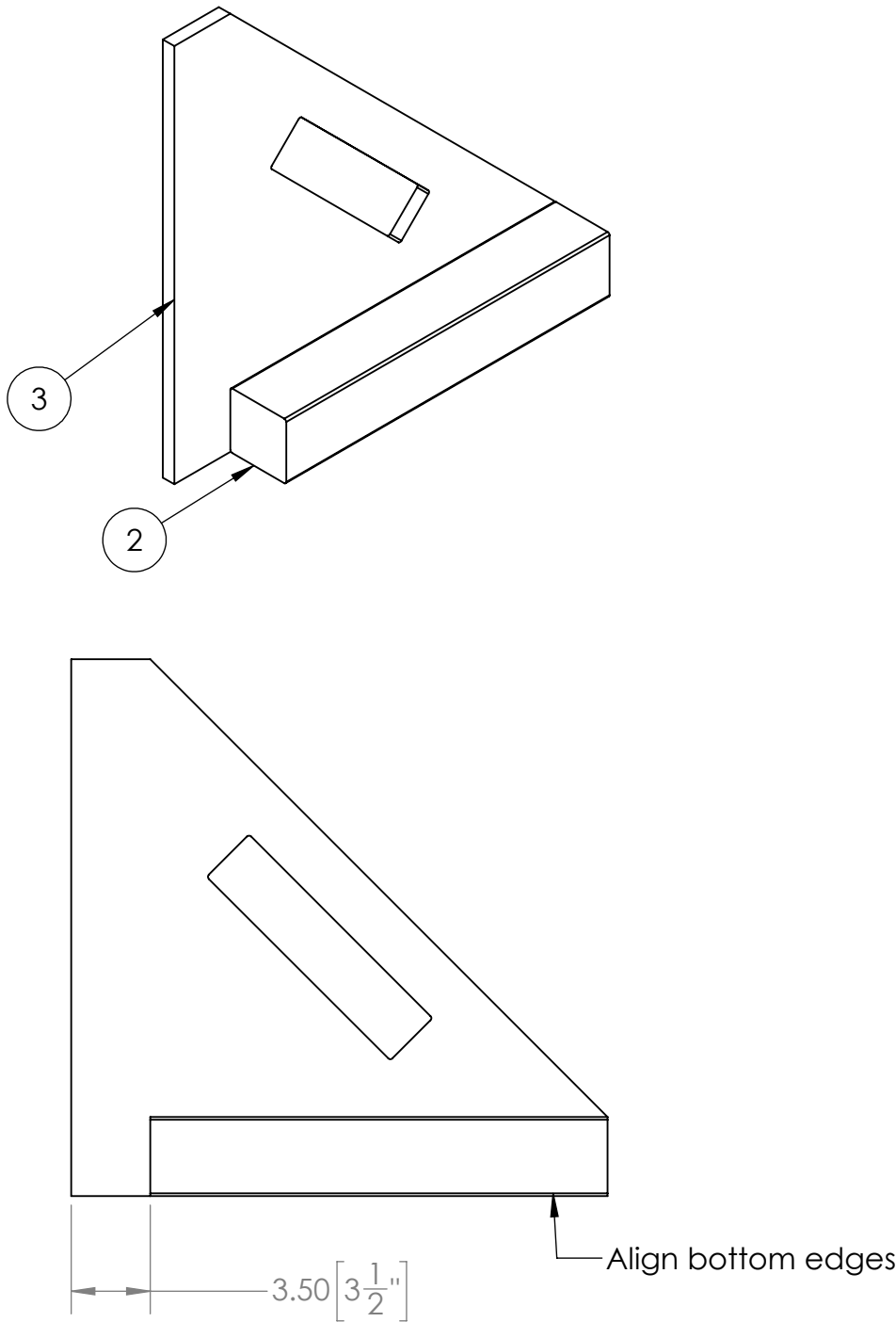
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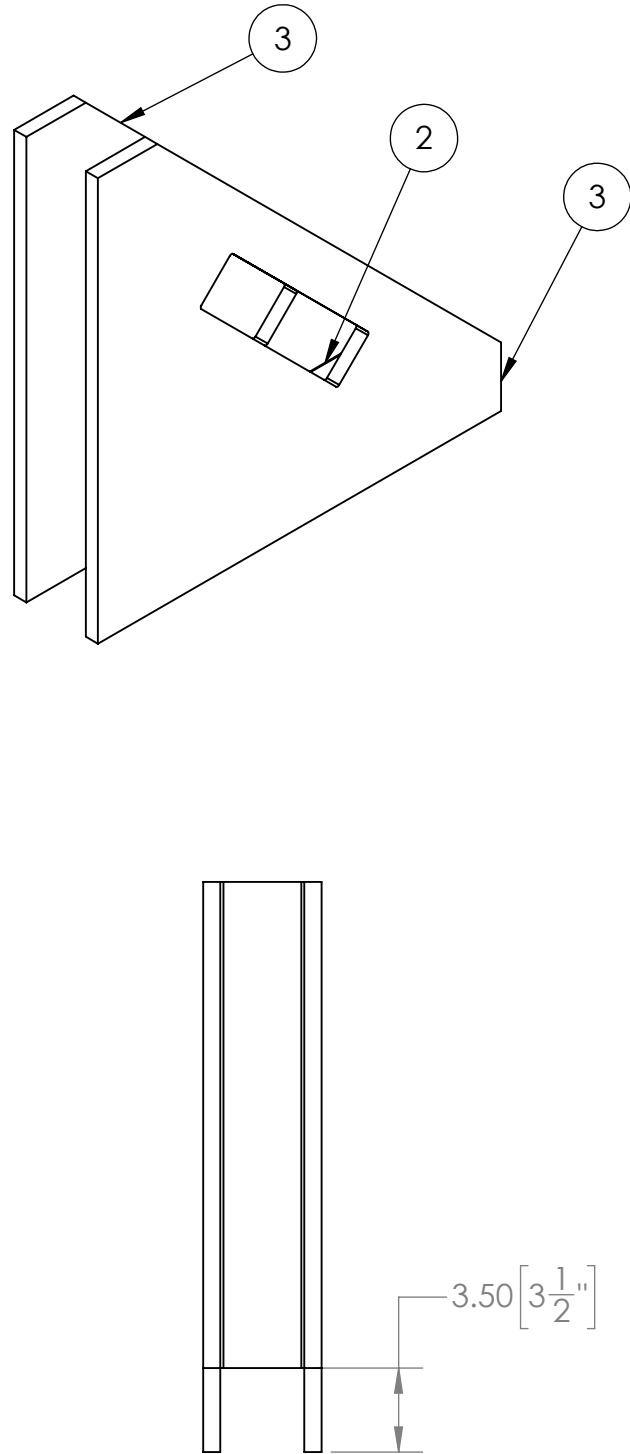
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Step 1



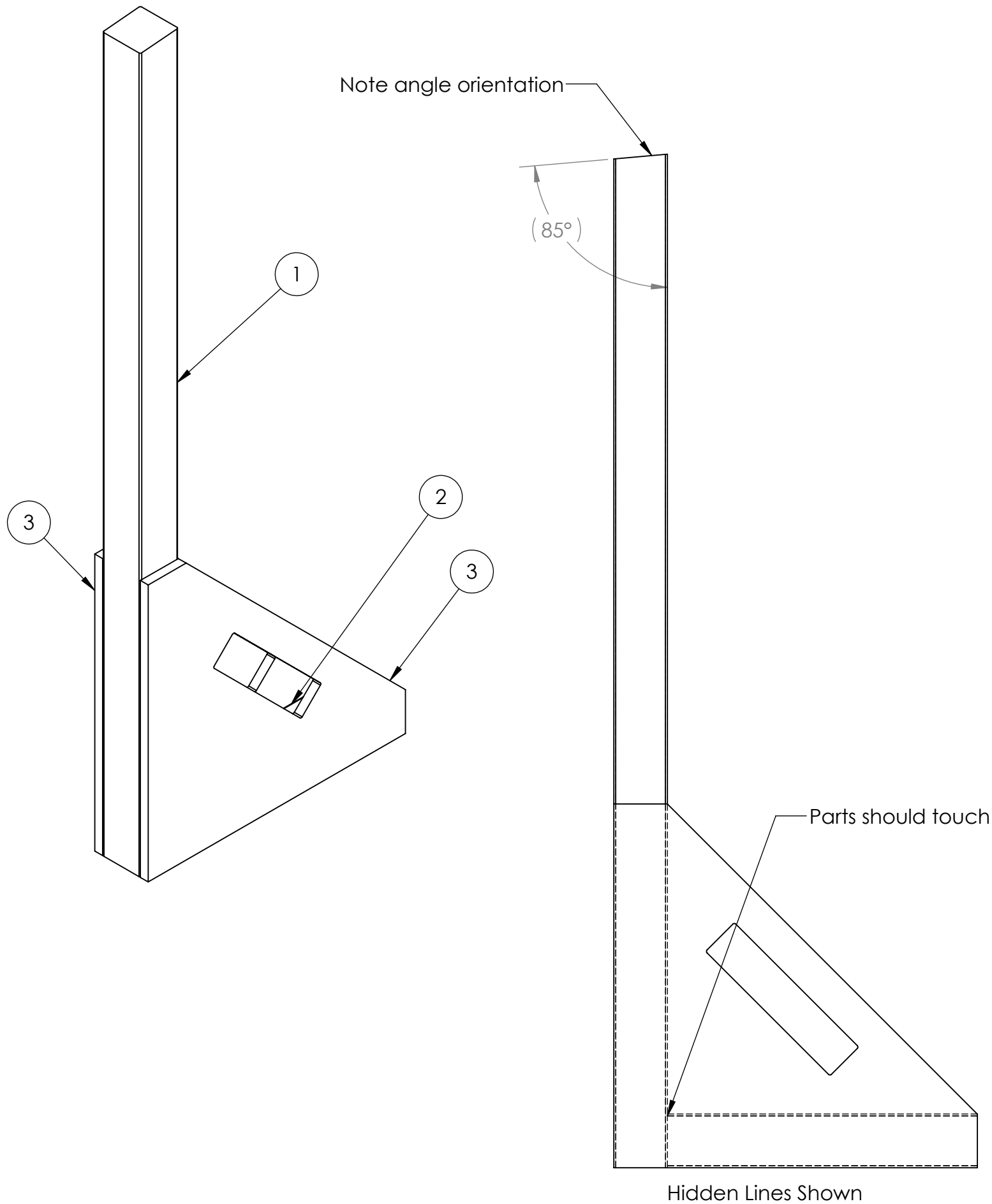
1. Align (2) and (3), as shown.
2. Connect using 2" long screws. It is recommended to use x5 screws.

Step 2





1. Add an additional (3) to Step 1, as shown.
2. Connect using 2" long screws. It is recommended to use x5 screws.

Step 3



1. Add (1) to Step 2 by sliding between both (3). Align as shown, such that (1) and (2) touch, and noting the orientation of the angle on (1).
2. Connect (1) to both (3) using 2" long screws. It is recommended to use x5 screws per (3).

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  MATERIAL/FINISH:   DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	KAMC	12/21/2021		
	PROPRIETARY AND CONFIDENTIAL  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.				TITLE: HUB - Complex Build - Lower Leg Assembly
SCALE: 1:8		SIZE	DWG. NO.	REV	
		C	TE-22177		
SHEET 3 OF 3					

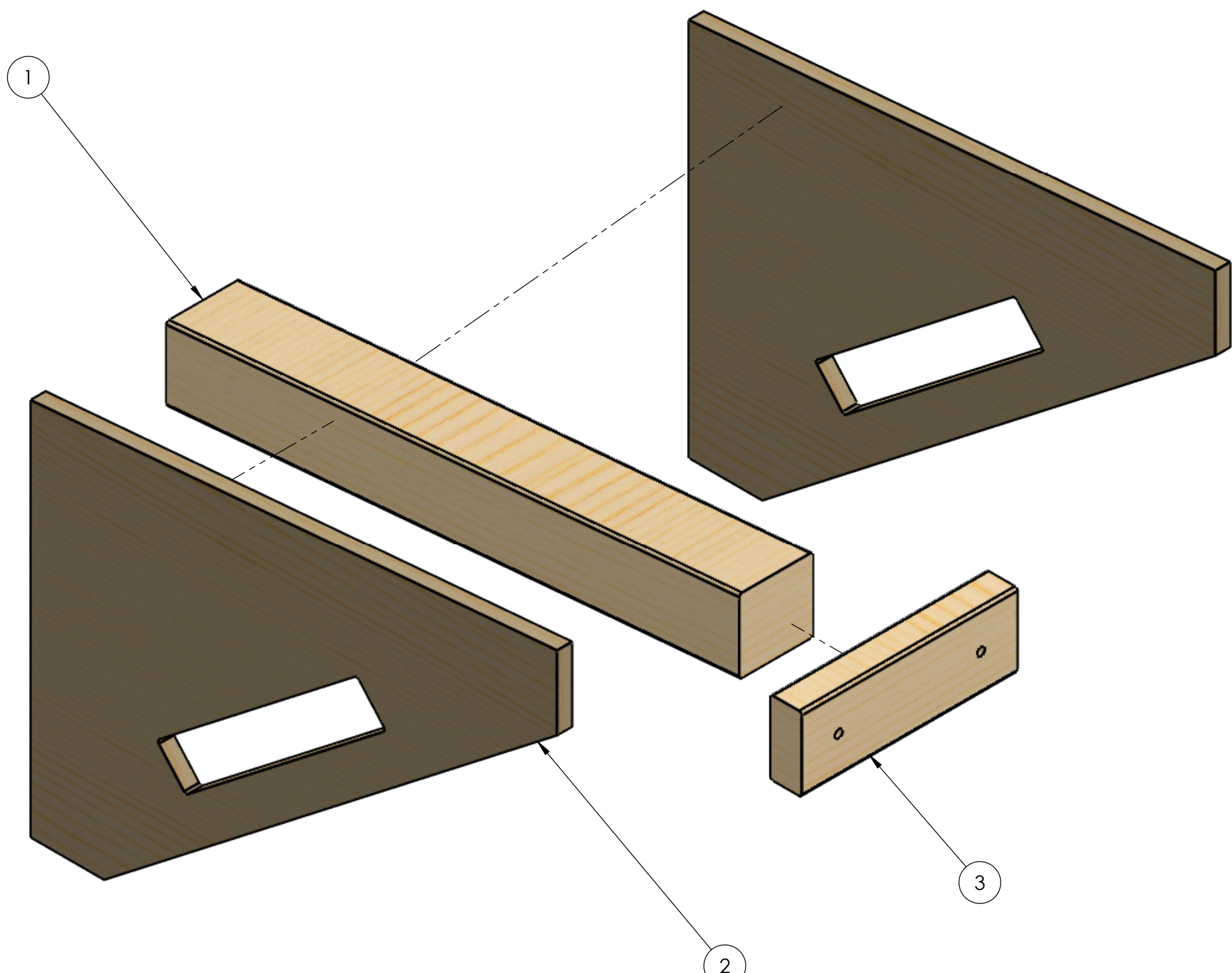
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C

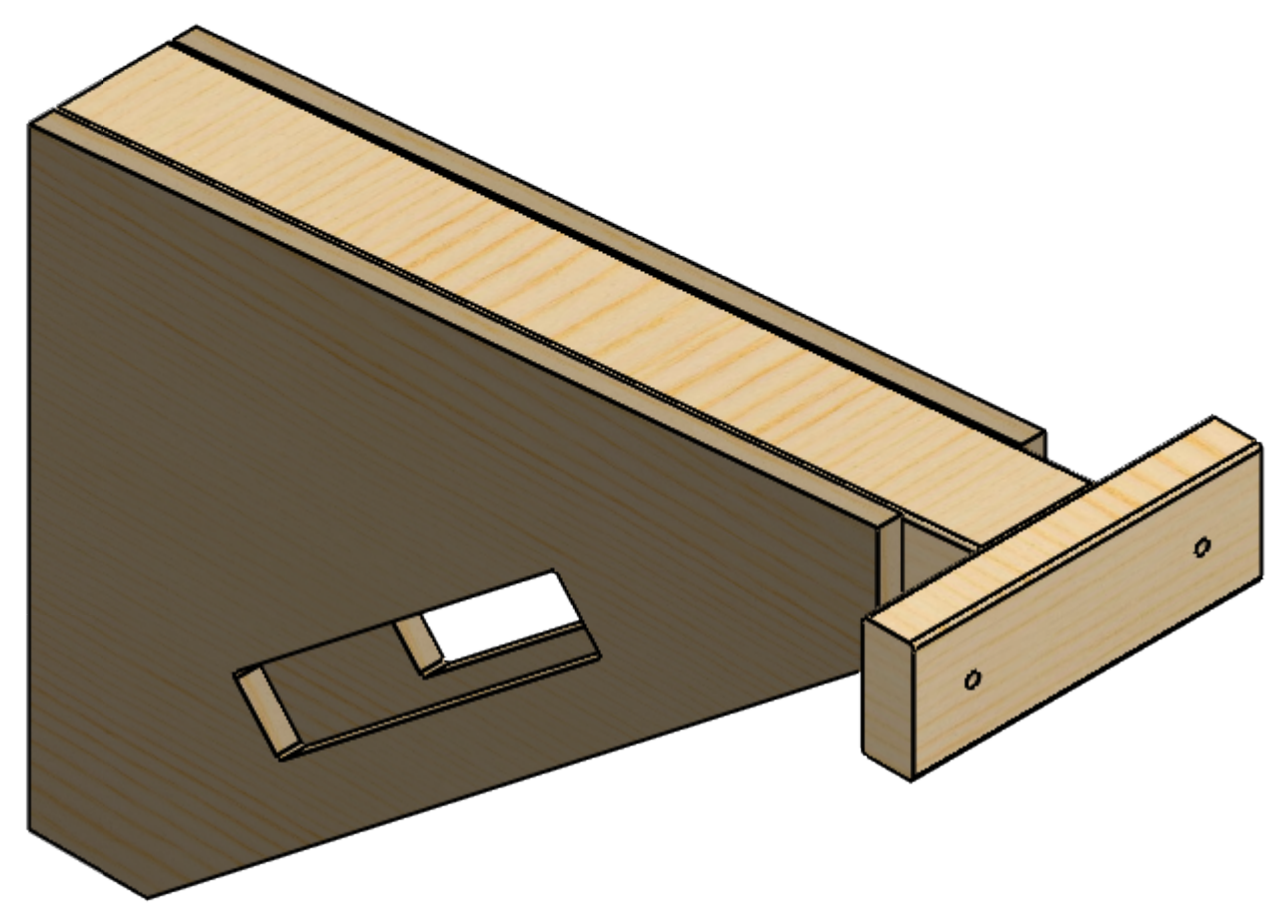
B

A





Exploded View



Hardware Needed:  
#8 x 2" Long Screw - Qty 10  
#8 x 2.5" Long Screw - Qty 5

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22174	HUB - Complex Build - Upper Leg 4x4	1
2	TE-22175	HUB - Complex Build - Upper Leg Side	2
3	TE-22176	HUB - Complex Build - Upper Leg to Connection Box 2x4	1

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL ±1/16  
ANGULAR: MACH ±1° BEND ±1°  
TWO PLACE DECIMAL ±.13  
THREE PLACE DECIMAL ±.125

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM  
DRAWN



NAME  
KAMC

DATE  
12/21/2021

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COMMENTS:  
REMOVE ALL BURRS AND SHARP EDGES.



TITLE:  
HUB - Complex Build - Upper Leg Assembly

SIZE  
C

DWG. NO.  
TE-22178

REV

SCALE: 1:4

SHEET 1 OF 3



D

D

C

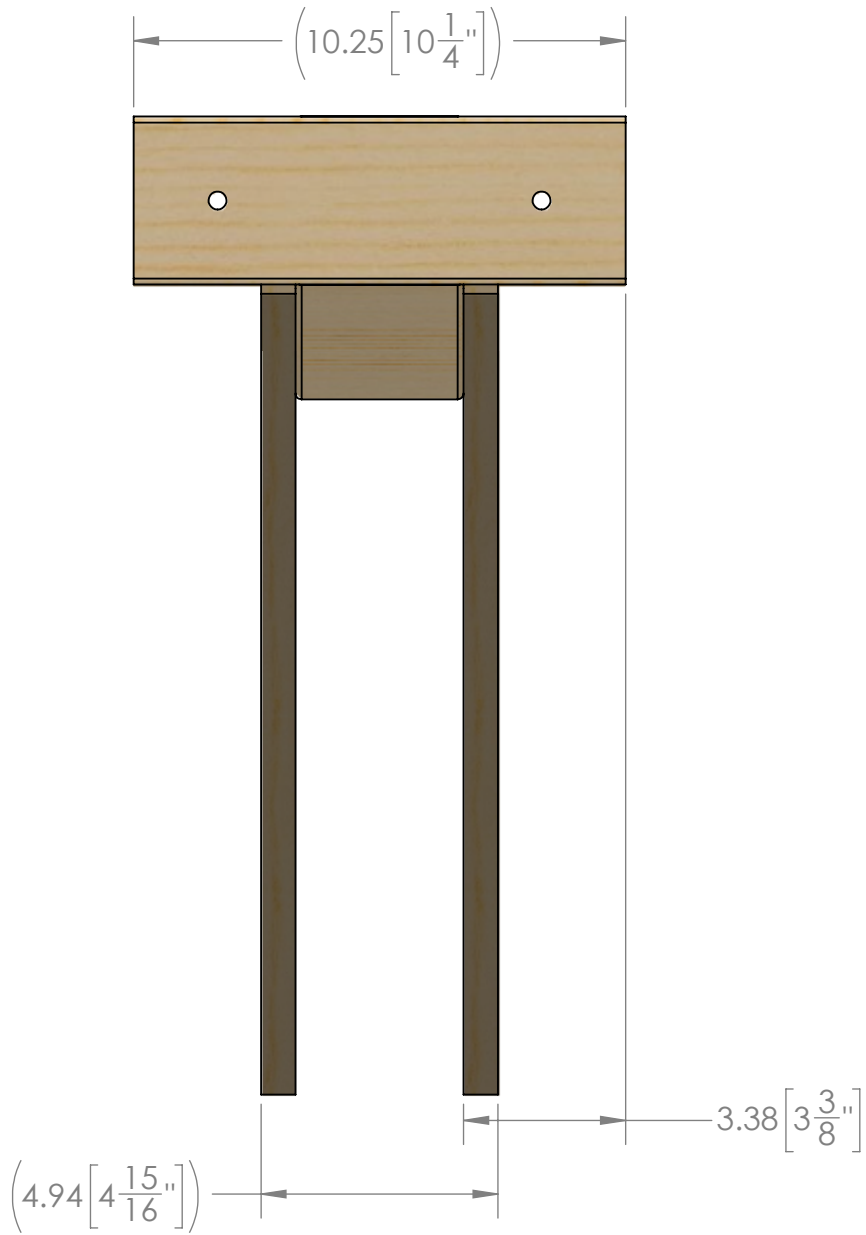
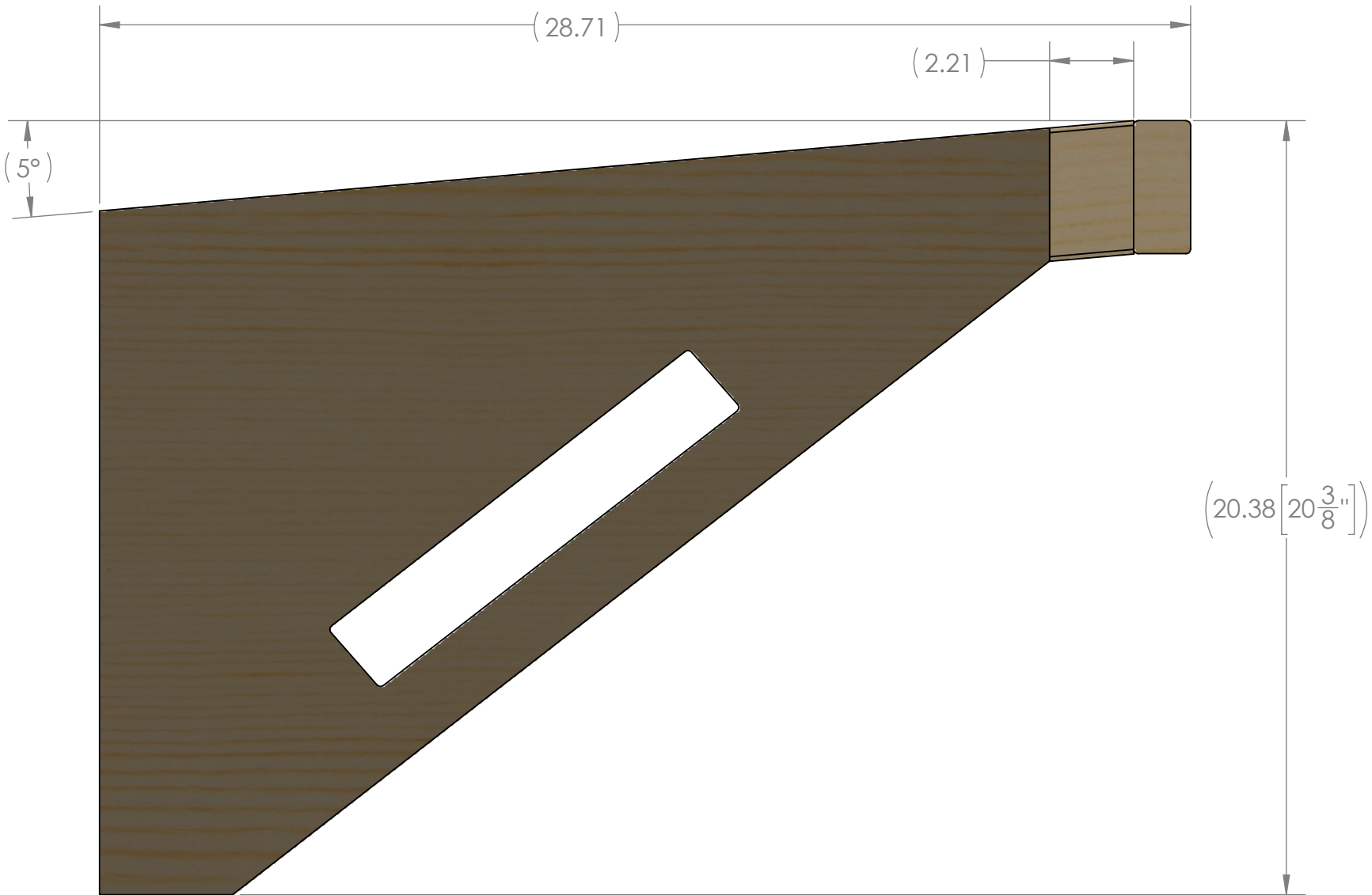
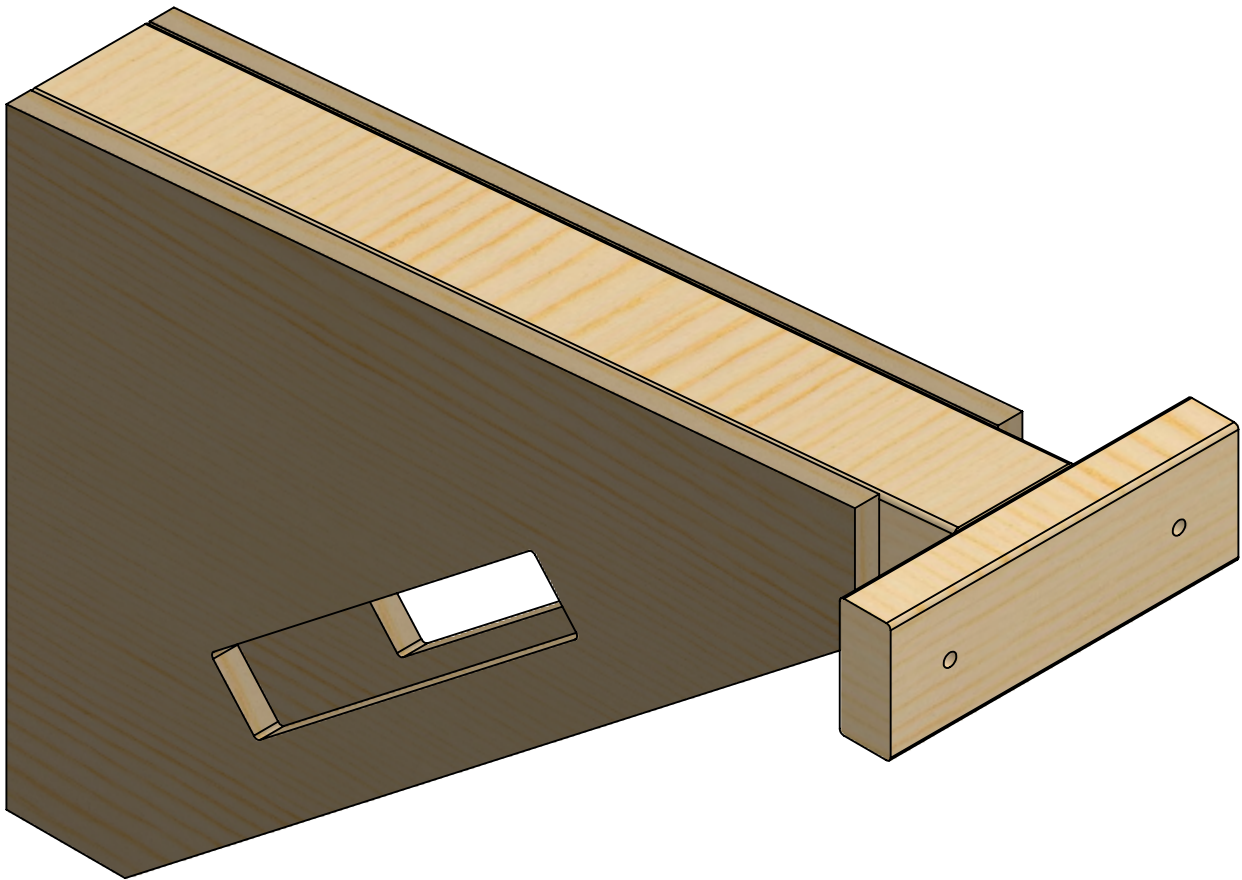
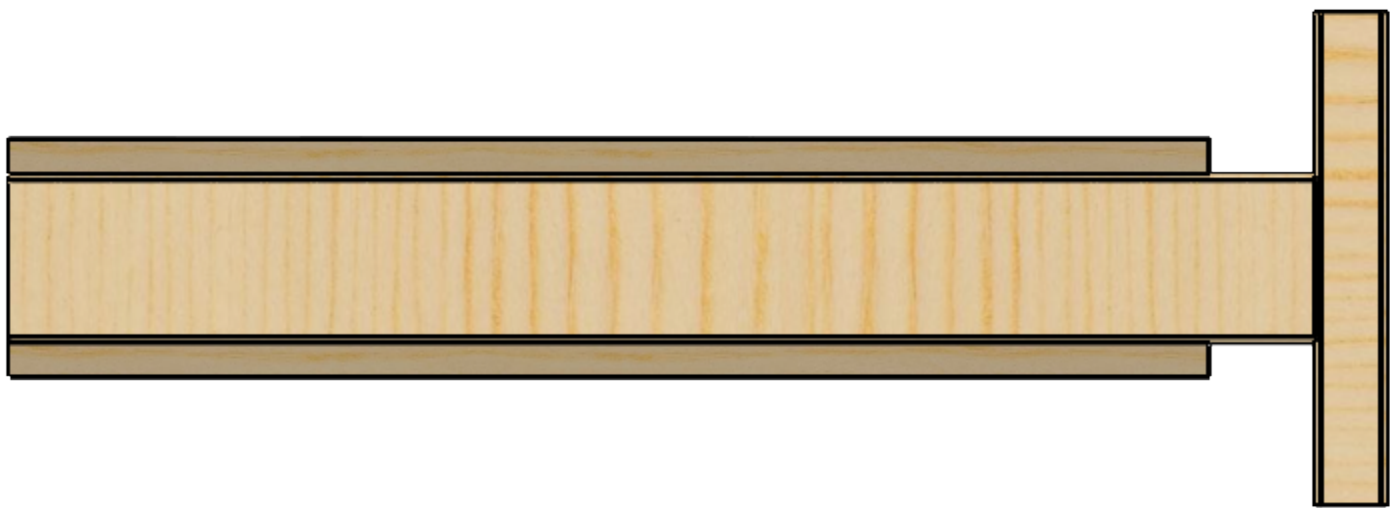
C



B

B

A

A

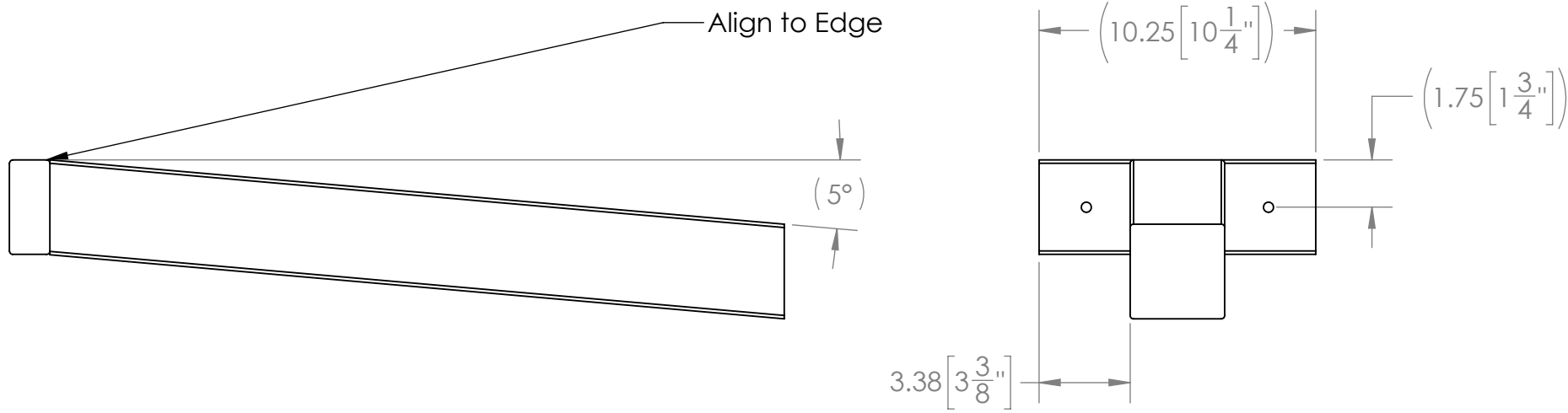


UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/21/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			TITLE:		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			HUB - Complex Build - Upper Leg Assembly		
MATERIAL/FINISH:	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
				C	TE-22178	
DO NOT SCALE DRAWING				SCALE: 1:4		SHEET 2 OF 3

D

Step 1

- 1. Align (3) on (1), as shown.
- 2. Connect using 2.5" long screws. It is recommended to use 5x screws.

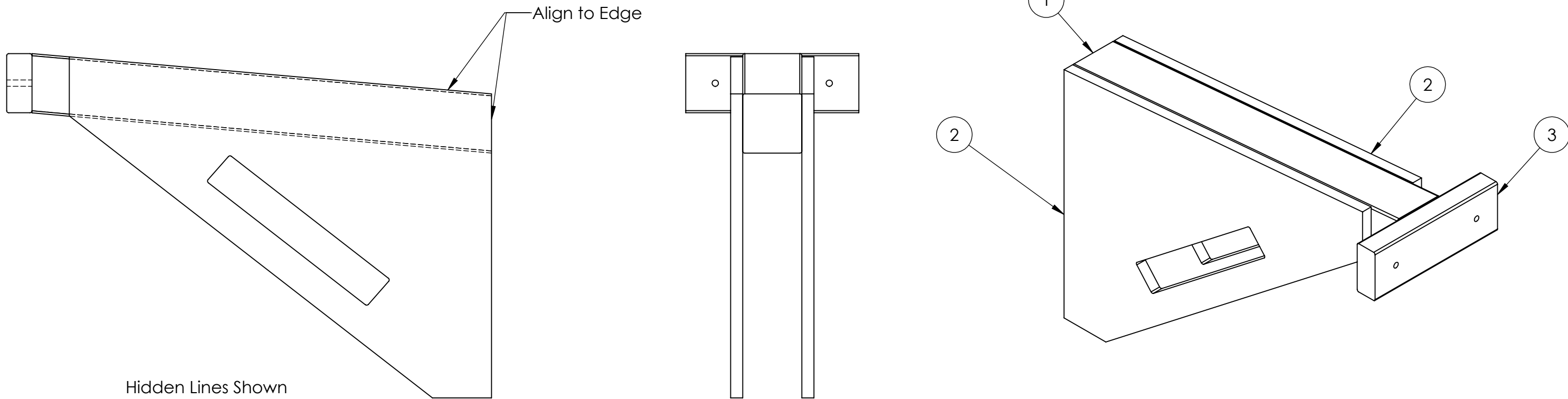


D

C

Step 2

- 1. Add x1 (2) to each side of (1), as shown.
- 2. Connect using 2" long screws. It is recommended to use 5x screws per (2).





C

B

B

A

A

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  MATERIAL/FINISH:   DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	KAMC	12/21/2021		
	PROPRIETARY AND CONFIDENTIAL  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.				TITLE: HUB - Complex Build - Upper Leg Assembly
	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.				SIZE C
		DWG. NO.		REV	
		TE-22178			
		SCALE: 1:6		SHEET 3 OF 3	



4

3

2

1

D

D

C

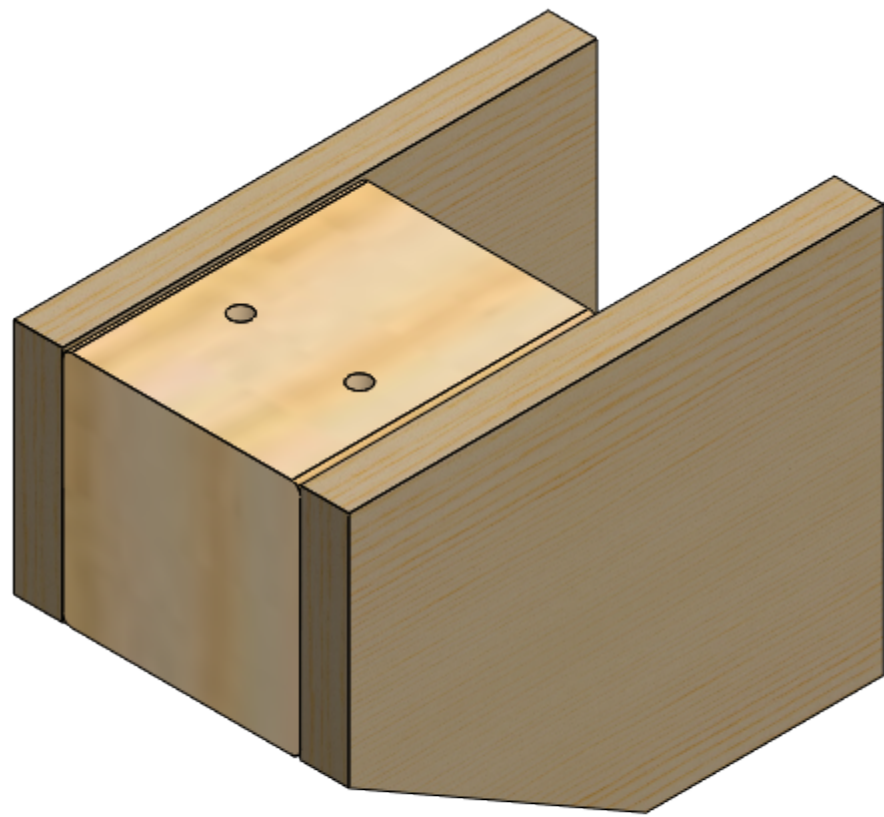
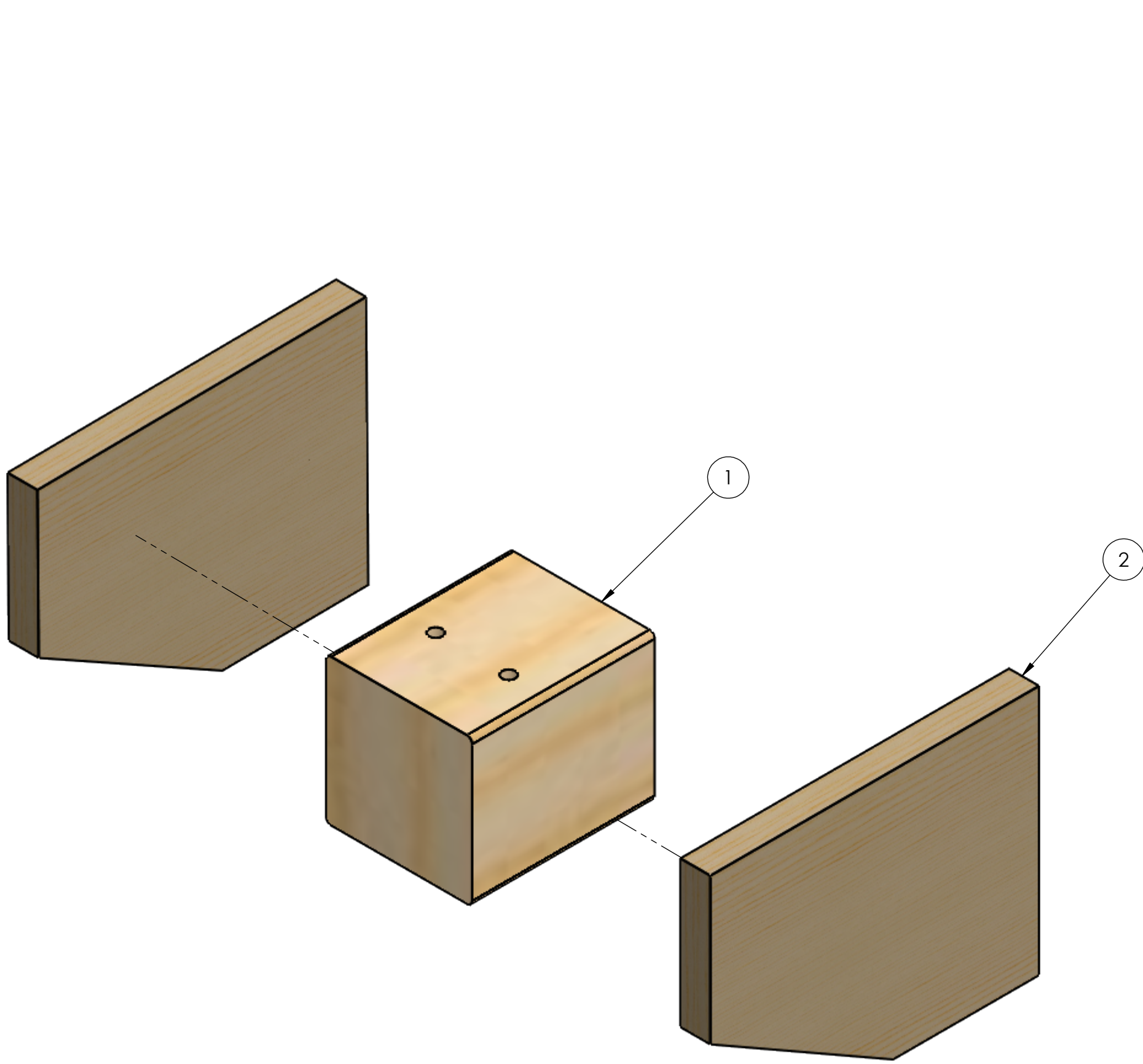
C

B

B



A

A

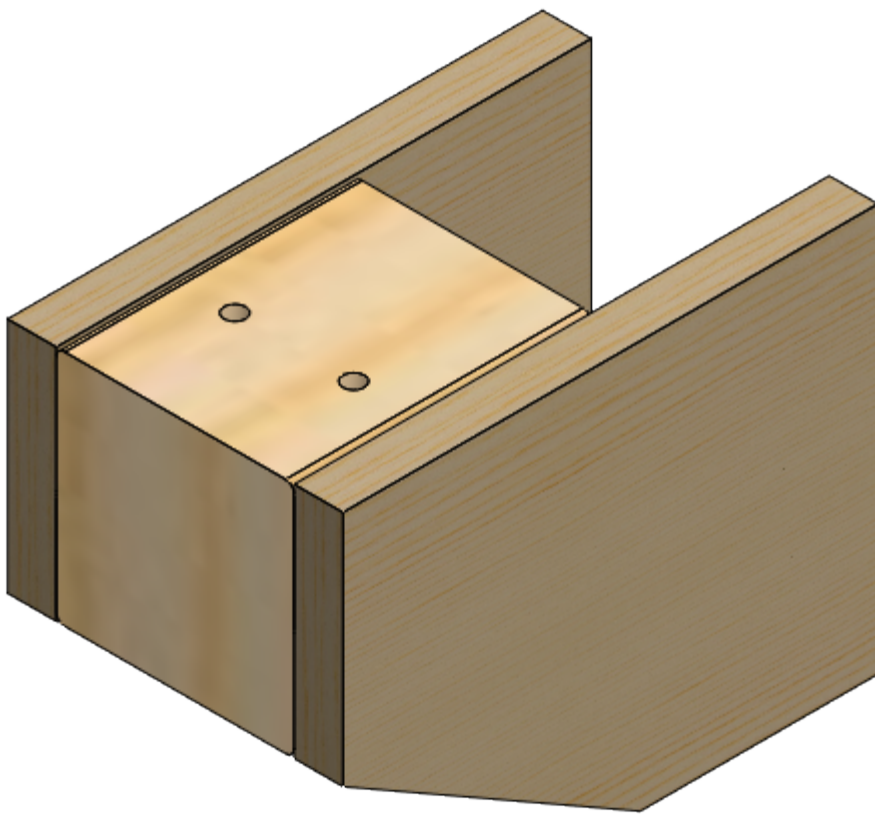
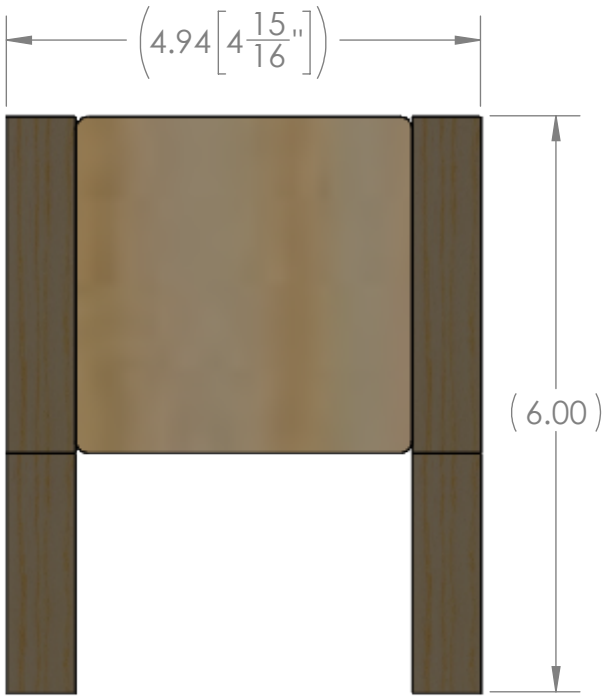
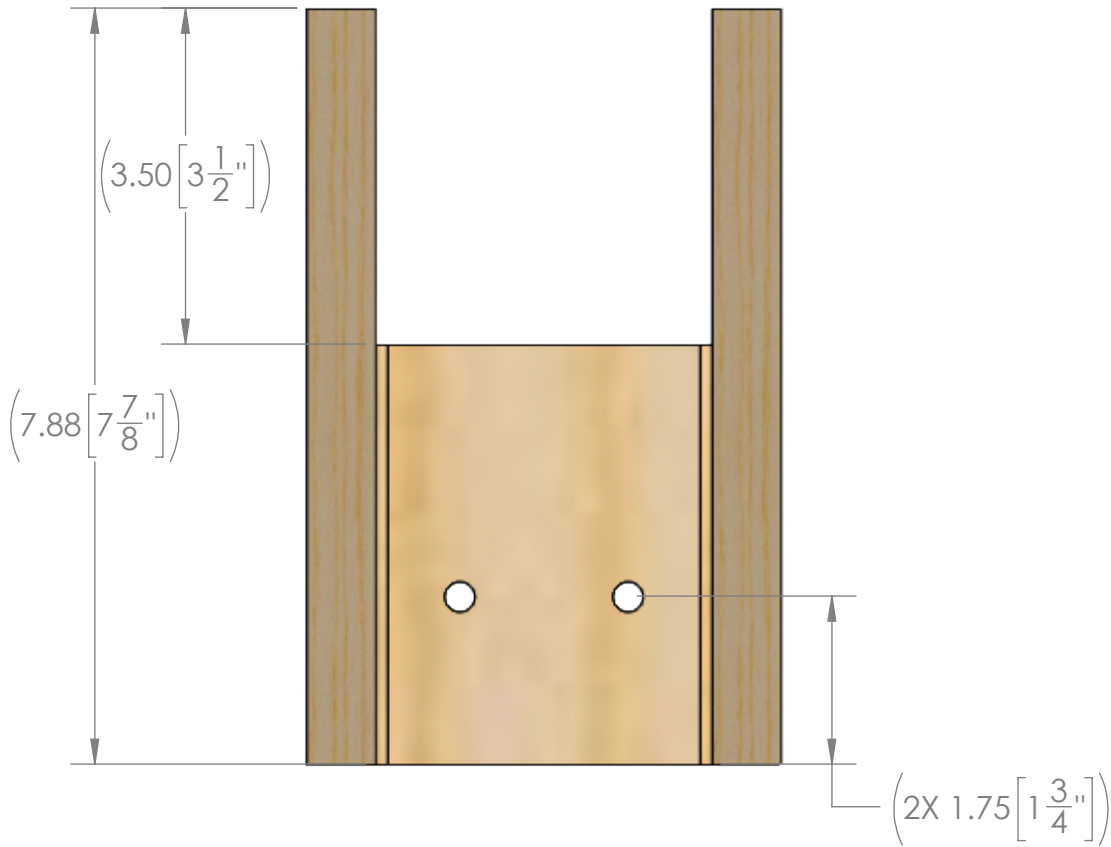




Hardware Needed:  
#8 x 2" Long Screw - Qty 8

ITEM NO.	PART NUMBER	DESCRIPTION	
1	TE-22181	HUB - Complex Build - Lower Hub Ring to Leg 4x4	1
2	TE-22182	HUB - Complex Build - Lower Hub Ring to Leg Side	2

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>          DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	KAMC	12/21/2021		
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			TITLE: HUB - Complex Build - Lower Hub Ring to Leg Assembly	
			SIZE	DWG. NO.	REV
			C	TE-22180	
			SCALE: 1:2		SHEET 1 OF 3

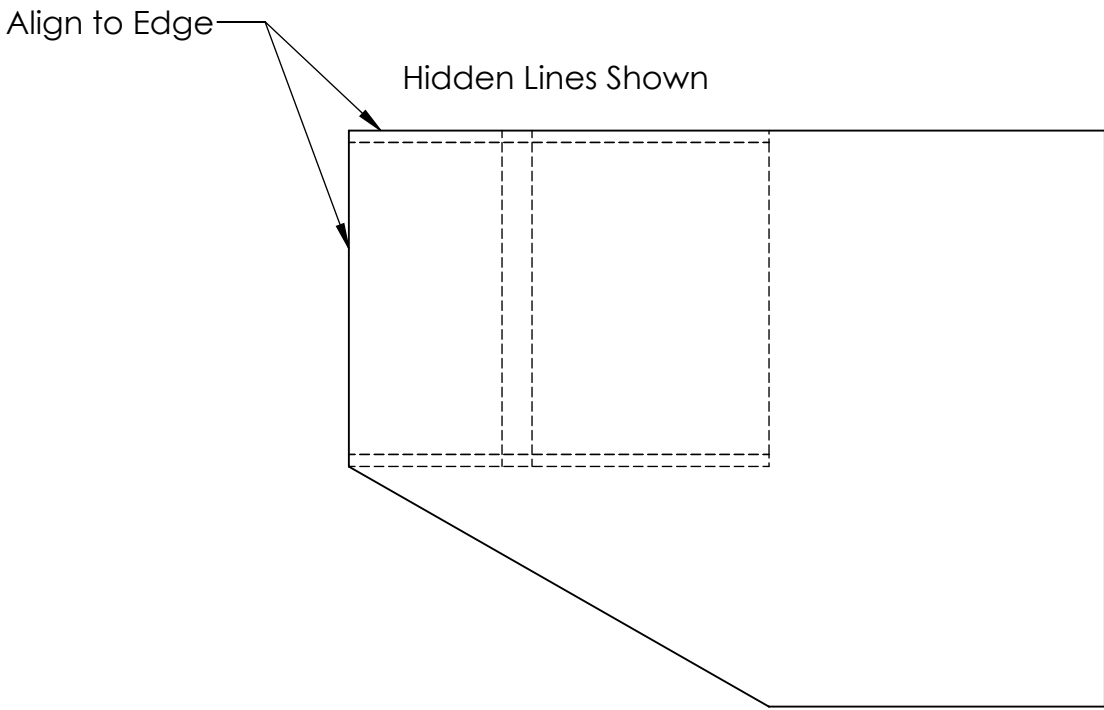
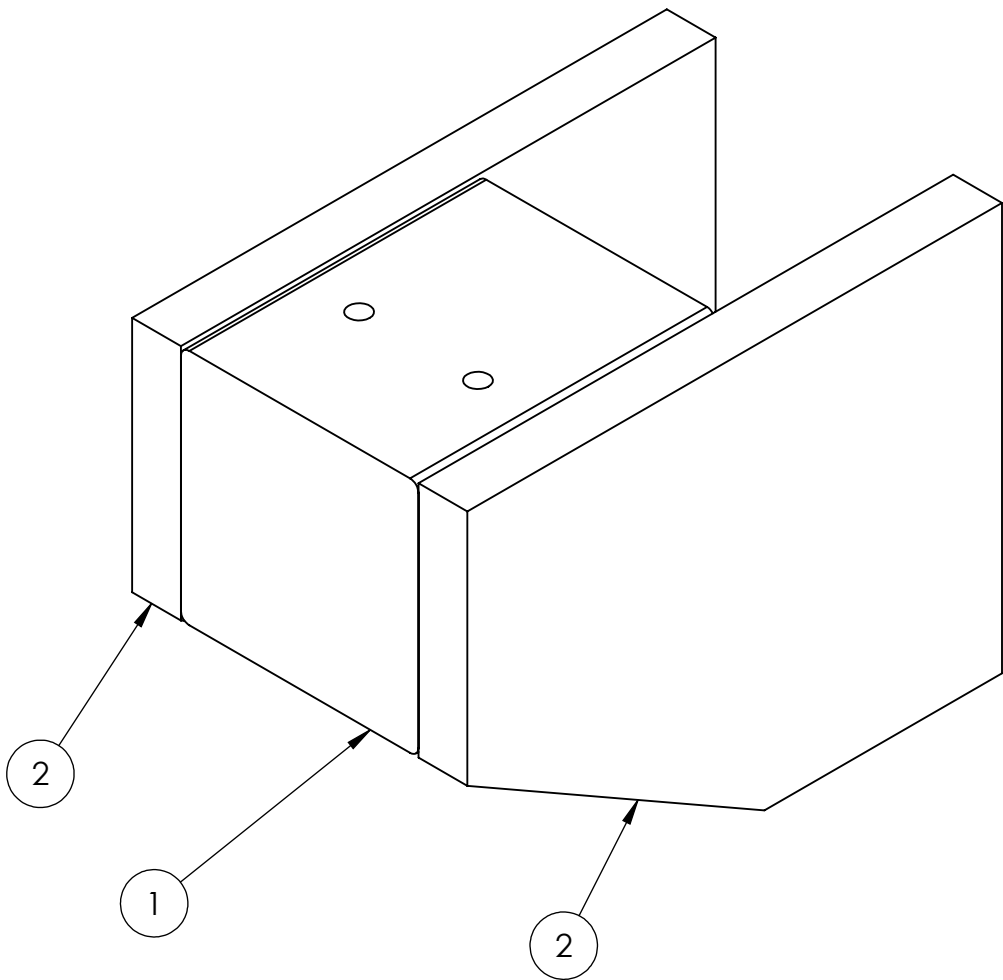
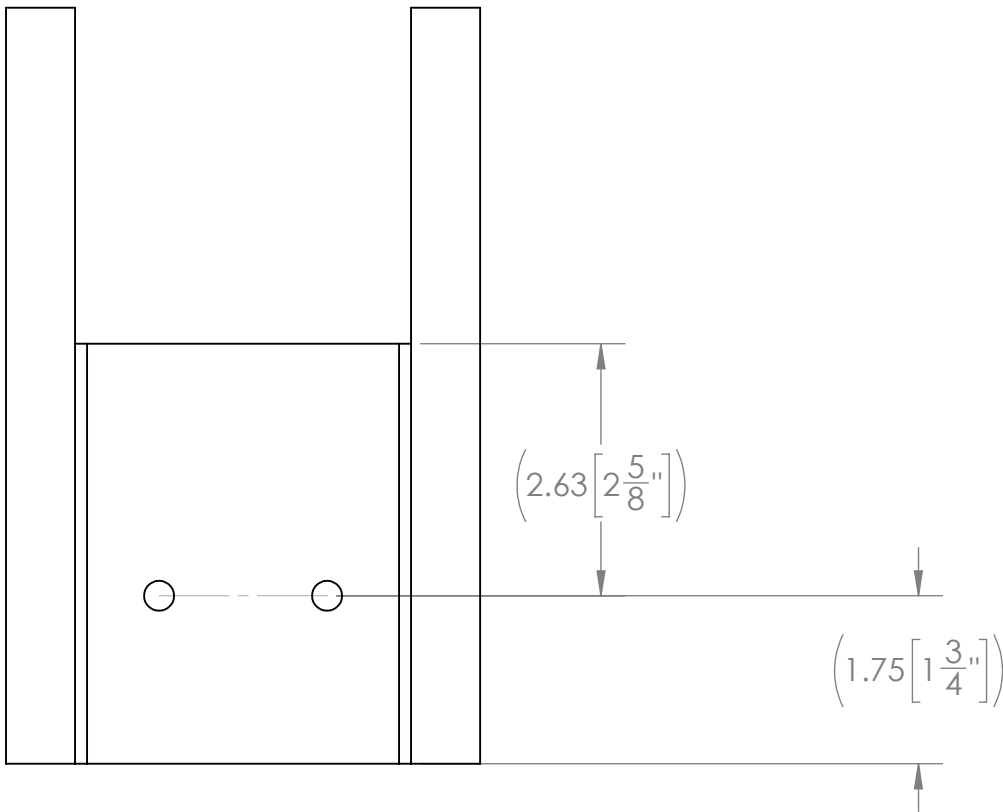






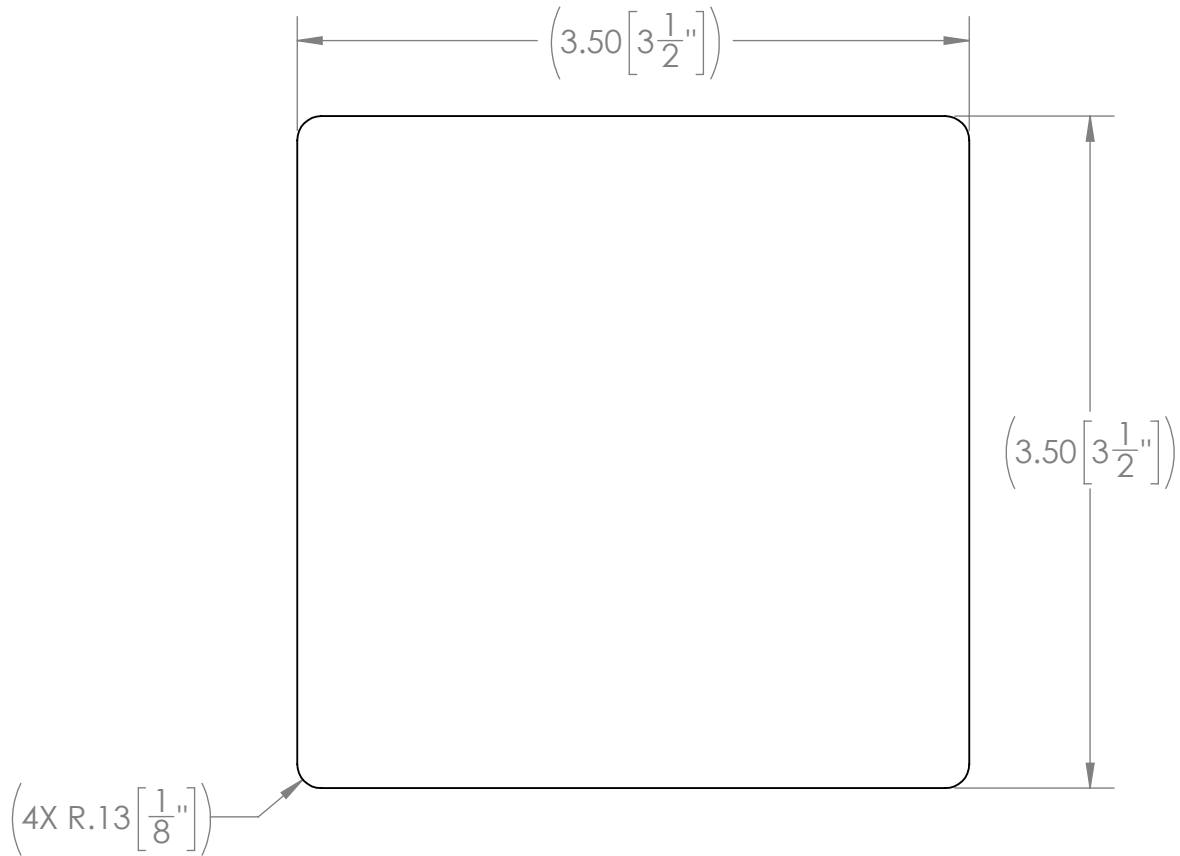
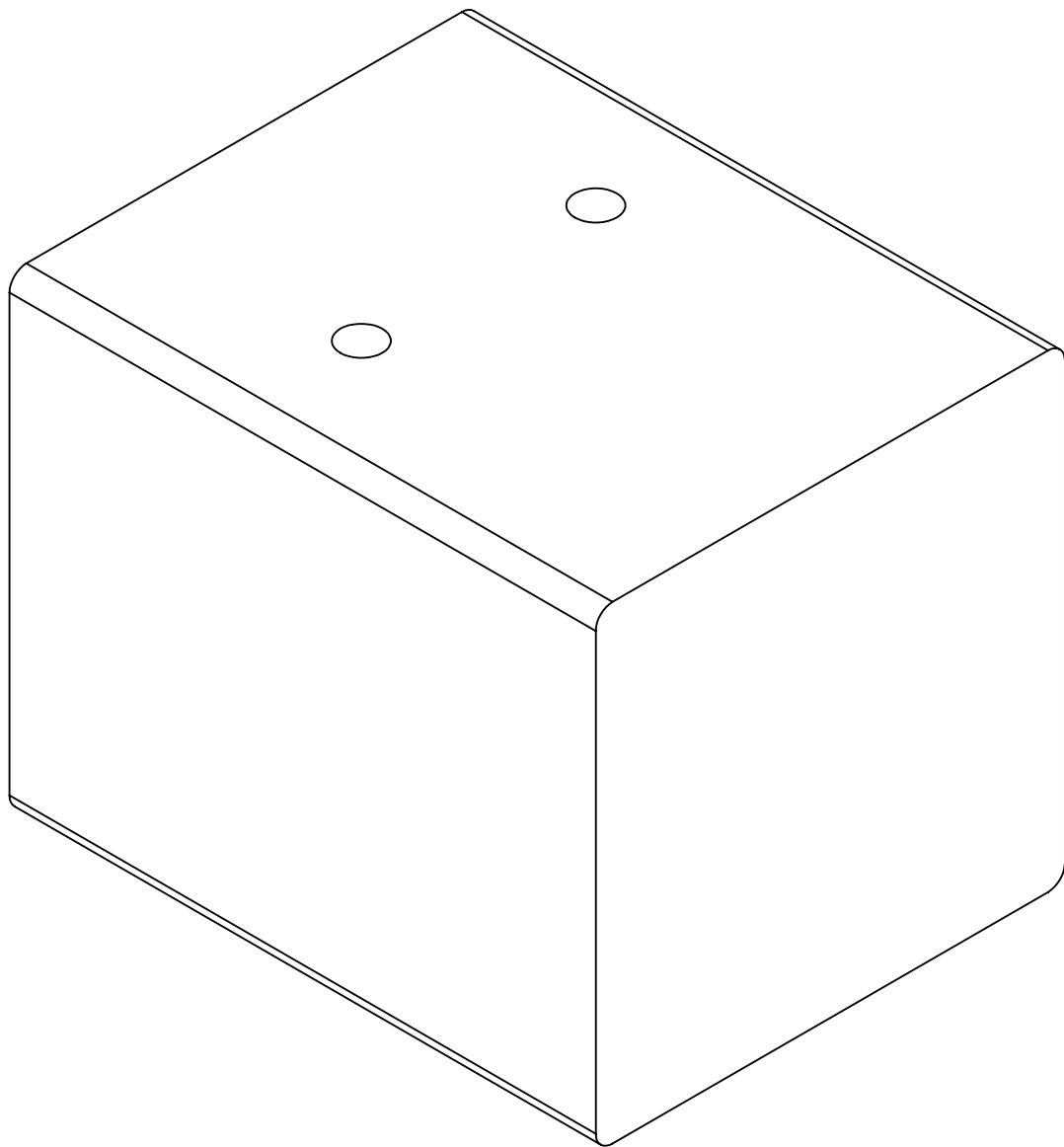
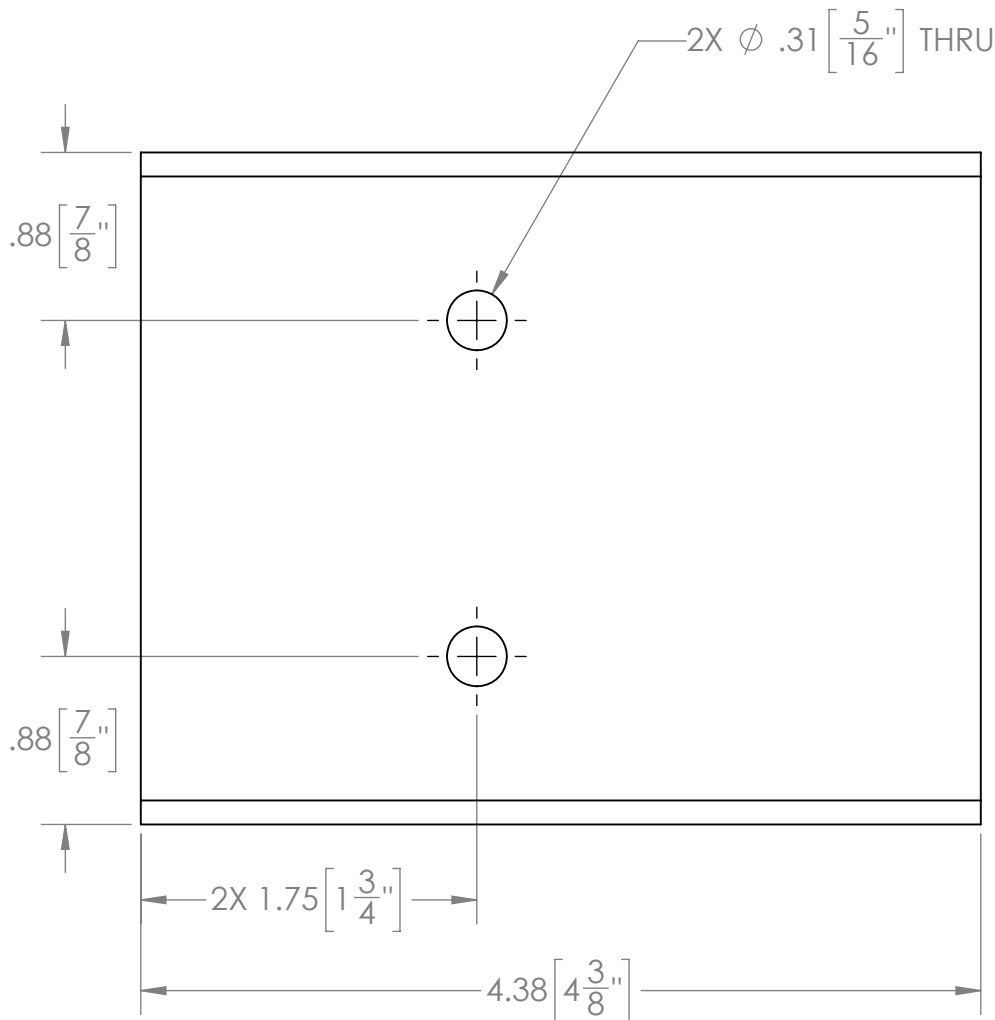
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	DRAWN	KAMC	12/21/2021						
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.								
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.								



Step 1

1. Align 2x 2 to 1 , as shown.
2. Connect using 2" long screws. It is recommended to use 4x screws per 2 .

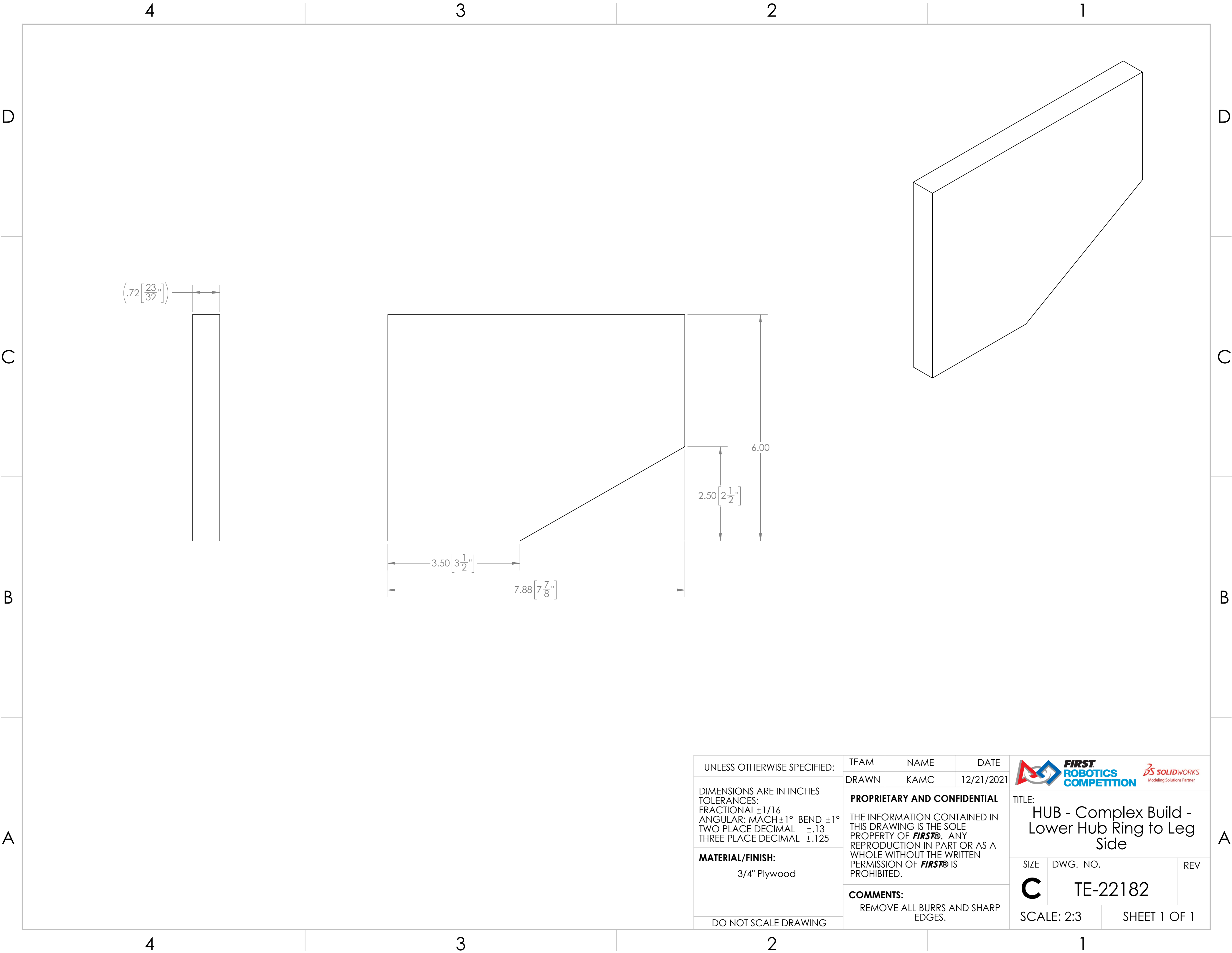




UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div><div></div><div>TITLE: HUB - Complex Build - Lower Hub Ring to Leg Assembly</div></div>		
	DRAWN	KAMC	12/21/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			SIZE		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.					
MATERIAL/FINISH:	COMMENTS:			DWG. NO.		REV
DO NOT SCALE DRAWING	REMOVE ALL BURRS AND SHARP EDGES.			C	TE-22180	
				SCALE: 1:2		SHEET 3 OF 3



UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div><div></div><div>TITLE: HUB - Complex Build - Lower Hub Ring to Leg 4x4</div></div>					
	DRAWN	KAMC	12/21/2021						
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			SIZE		DWG. NO.		REV	
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.								
	COMMENTS:			C		TE-22181			
REMOVE ALL BURRS AND SHARP EDGES.									
DO NOT SCALE DRAWING				SCALE: 1:1		SHEET 1 OF 1			





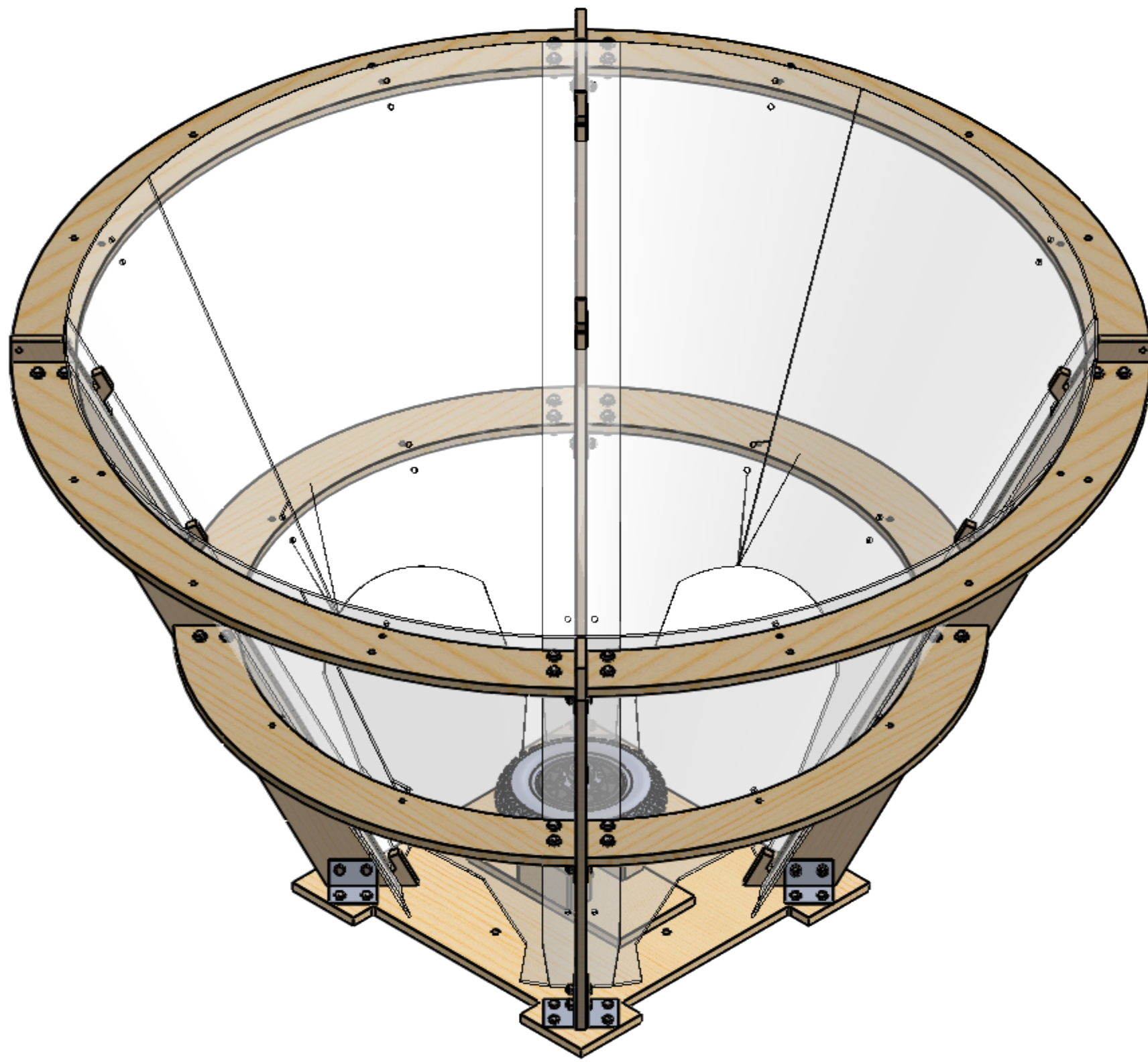
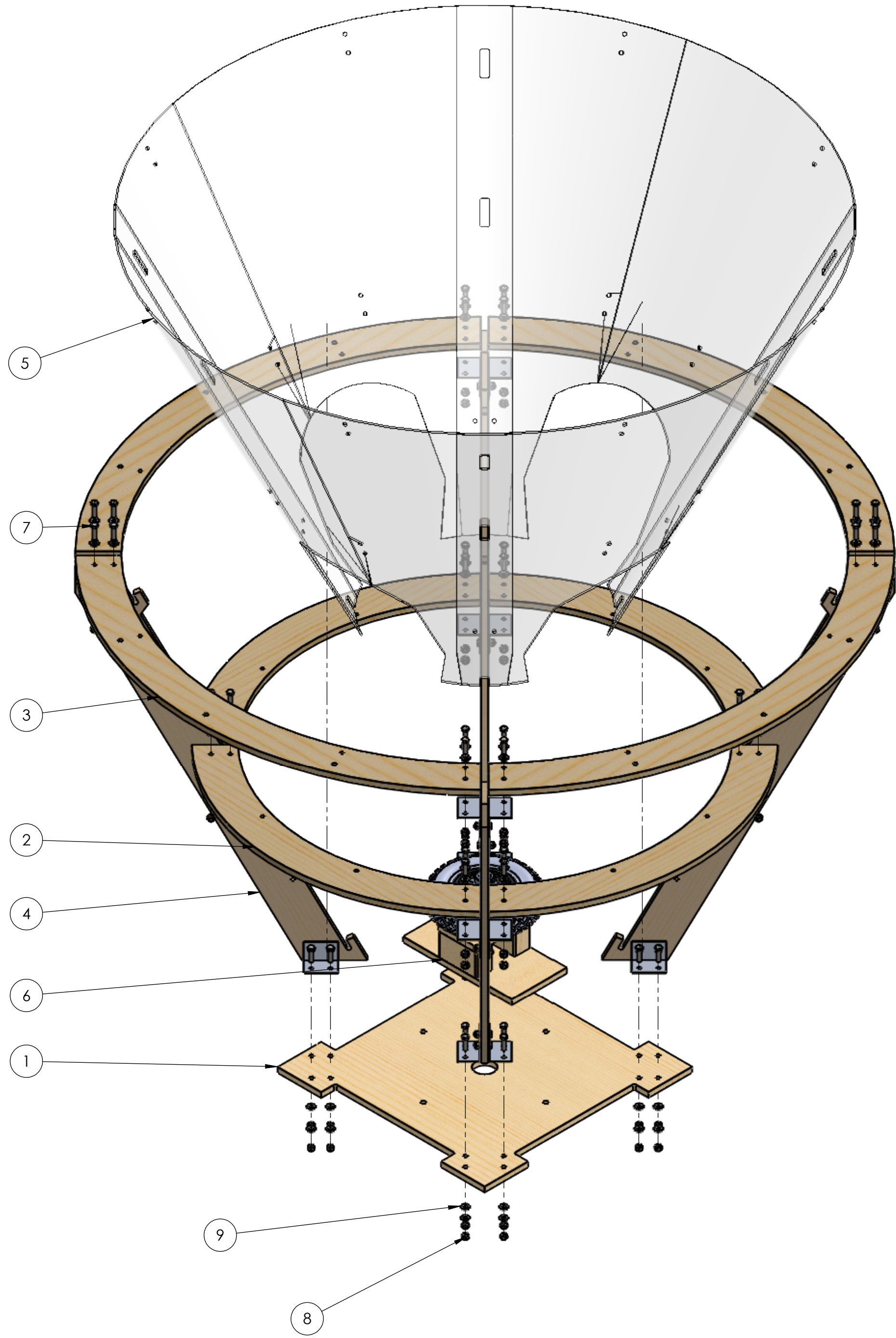
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	DRAWN	KAMC	12/21/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE	DWG. NO.	REV
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			<b>C</b>	TE-22182	
SCALE: 2:3		SHEET 1 OF 1				

D

C

B

A



Hardware Needed:  
#8 x 1" Long Screw - Qty 4  
50 lb. cable ties - Qty 20

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22191	Hub - Complex Build - Upper Hub Base	1
2	TE-22193	Hub - Complex Build - Upper Hub Lower Ring	4
3	TE-22194	Hub - Complex Build - Upper Hub Upper Ring	4
4	TE-22196	Hub - Complex Build - Upper Hub Vertical Support and Bracket Assembly	4
5	TE-22197	Hub - Complex Build - Upper Hub Plastic	4
6	TE-22210	Hub - Complex Build - Passive Agitator	1
7	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 3/4" long, fully threaded	48
8	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	48
9	washer_flat_.25	Flat Washer for 1/4" Screw	48



UNLESS OTHERWISE SPECIFIED:  
  
DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$   
  
MATERIAL/FINISH:  
  
DO NOT SCALE DRAWING

TEAM	NAME	DATE
DRAWN	CO	1/3/2022

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**COMMENTS:**  
REMOVE ALL BURRS AND SHARP EDGES.

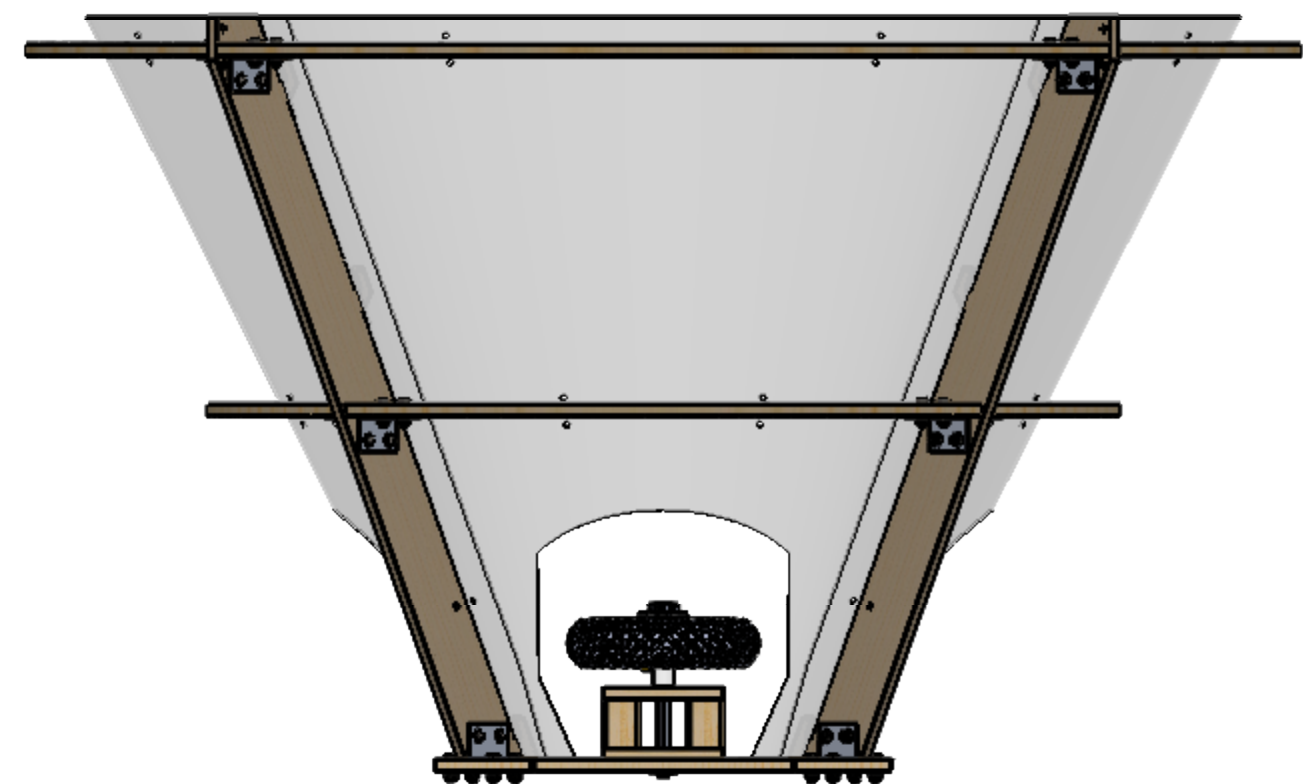
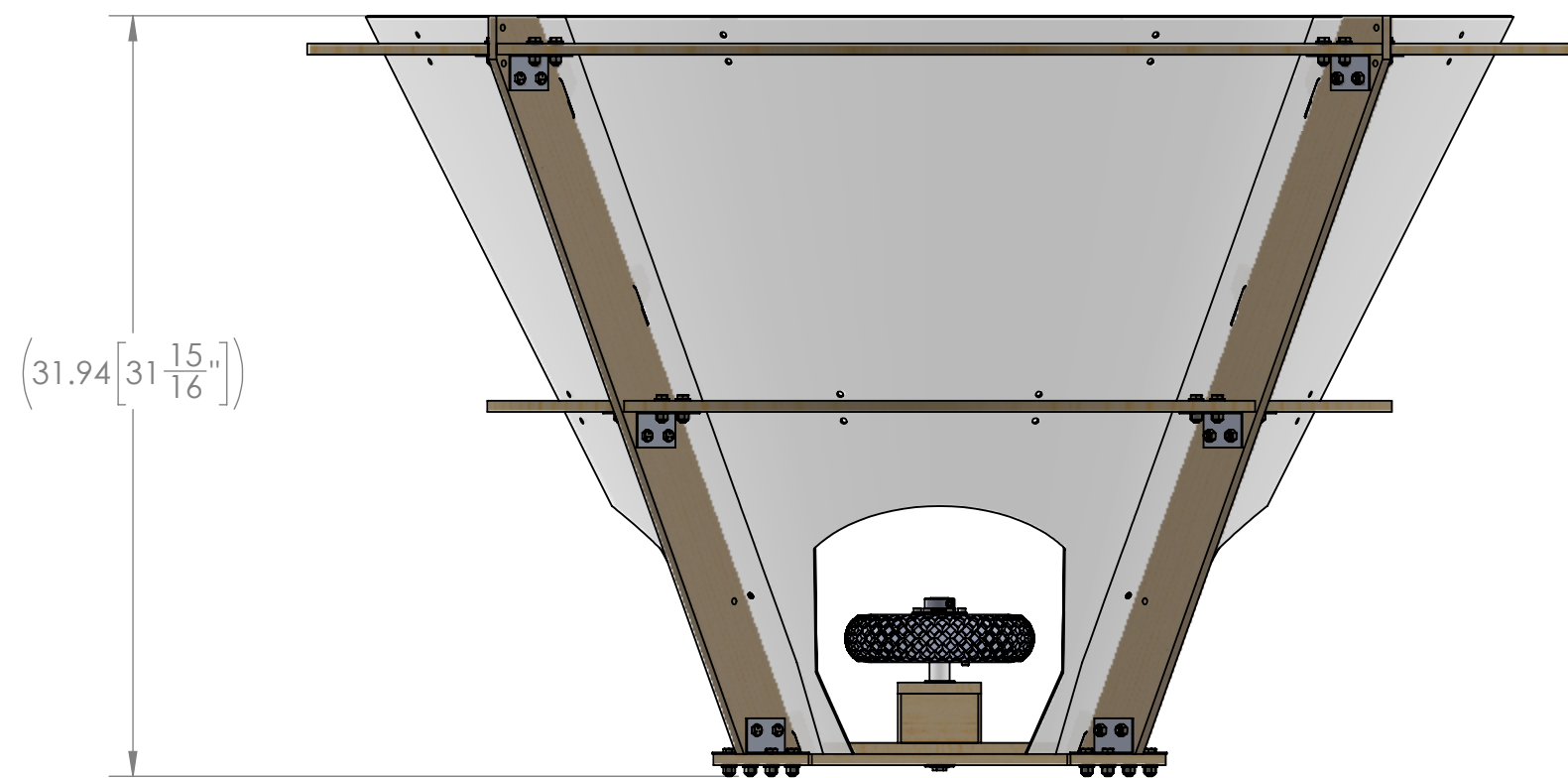
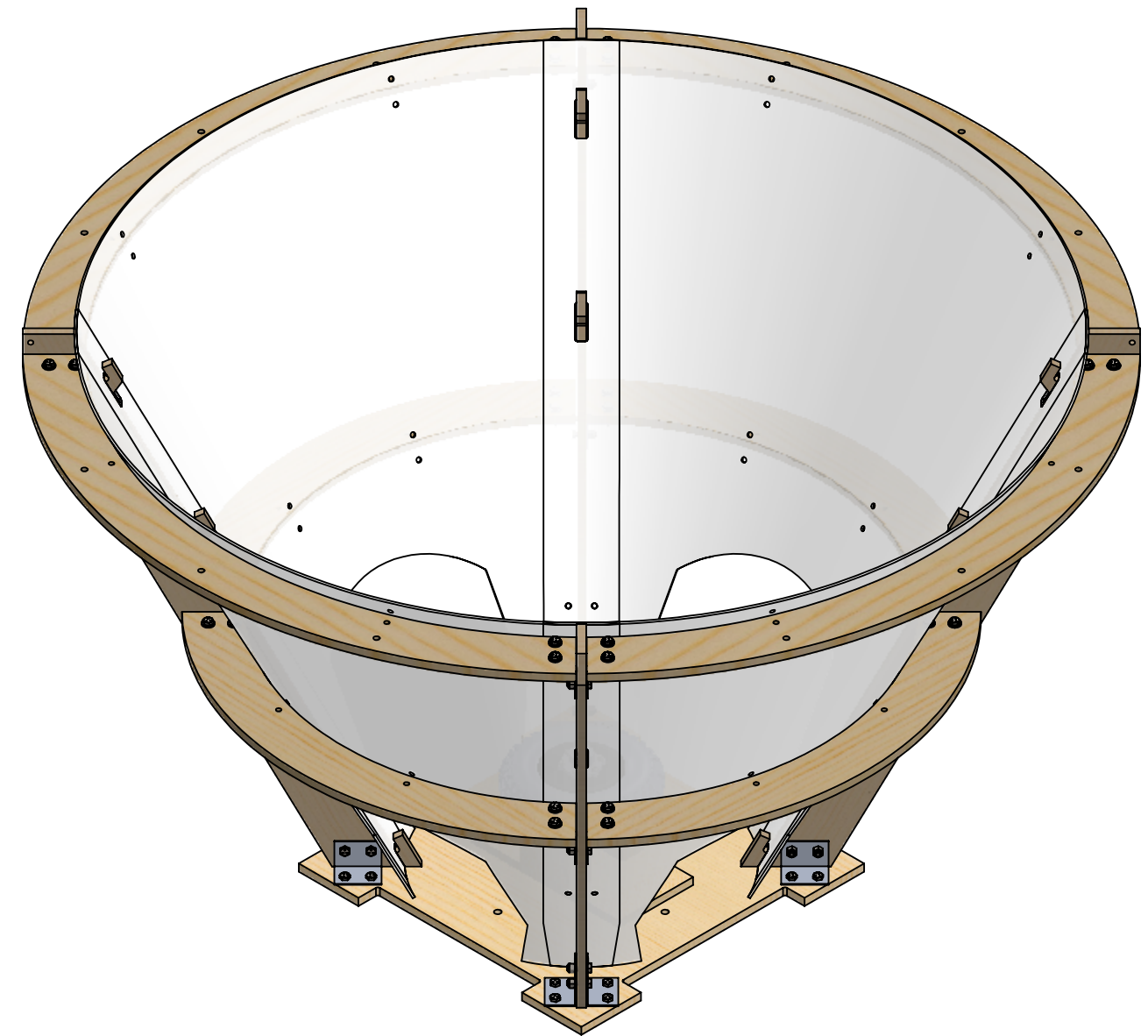
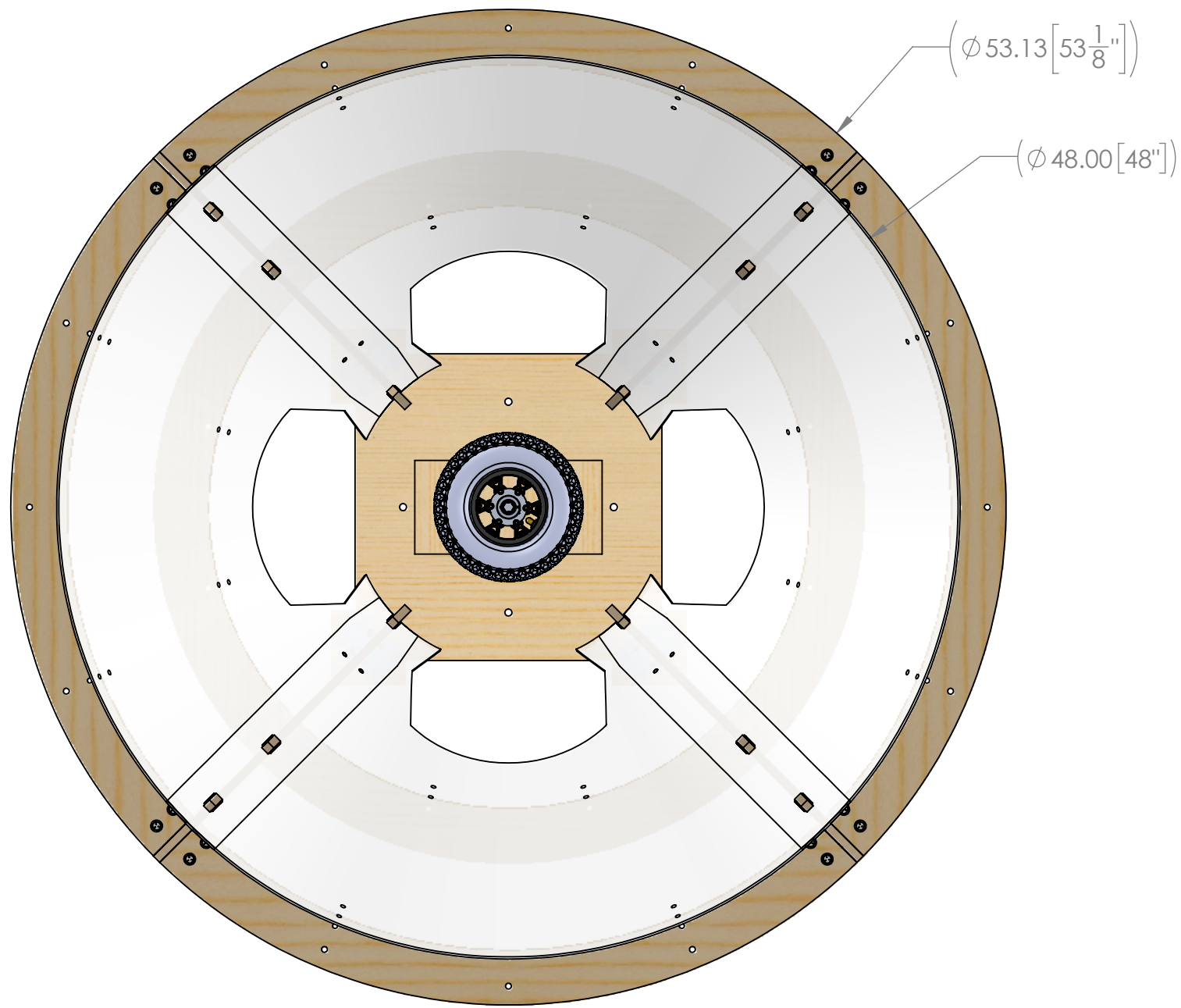




TITLE: Hub - Complex Build - Upper Hub Assembly

SIZE	DWG. NO.	REV
<b>C</b>	TE-22190	

SCALE: 1:6	SHEET 1 OF 5
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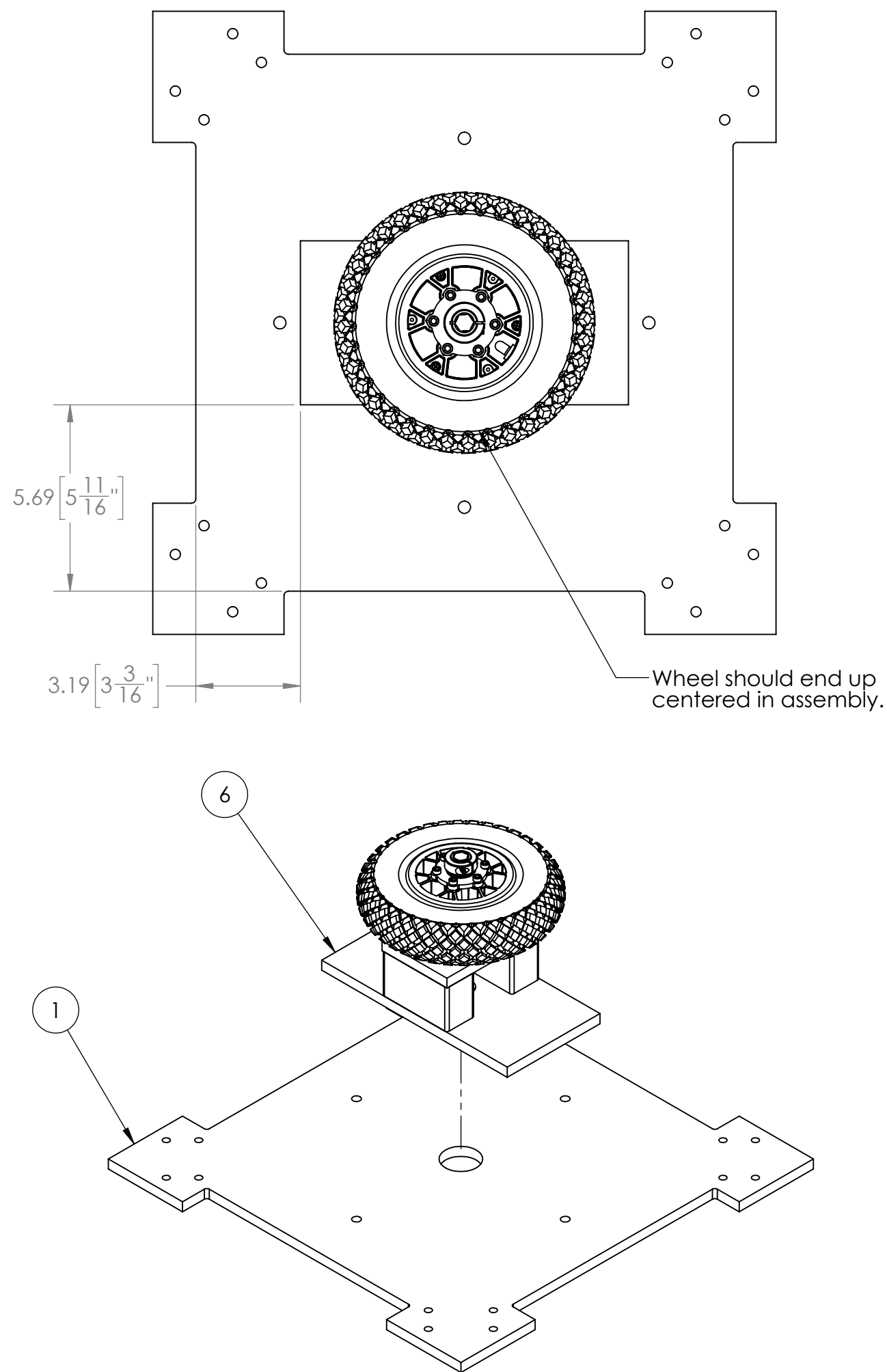




UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>     <b>DO NOT SCALE DRAWING</b>	TEAM	NAME	DATE	  TITLE: Hub - Complex Build - Upper Hub Assembly  SIZE C DWG. NO. TE-22190  SCALE: 1:8 SHEET 2 OF 5
	DRAWN	CO	1/3/2022	
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			

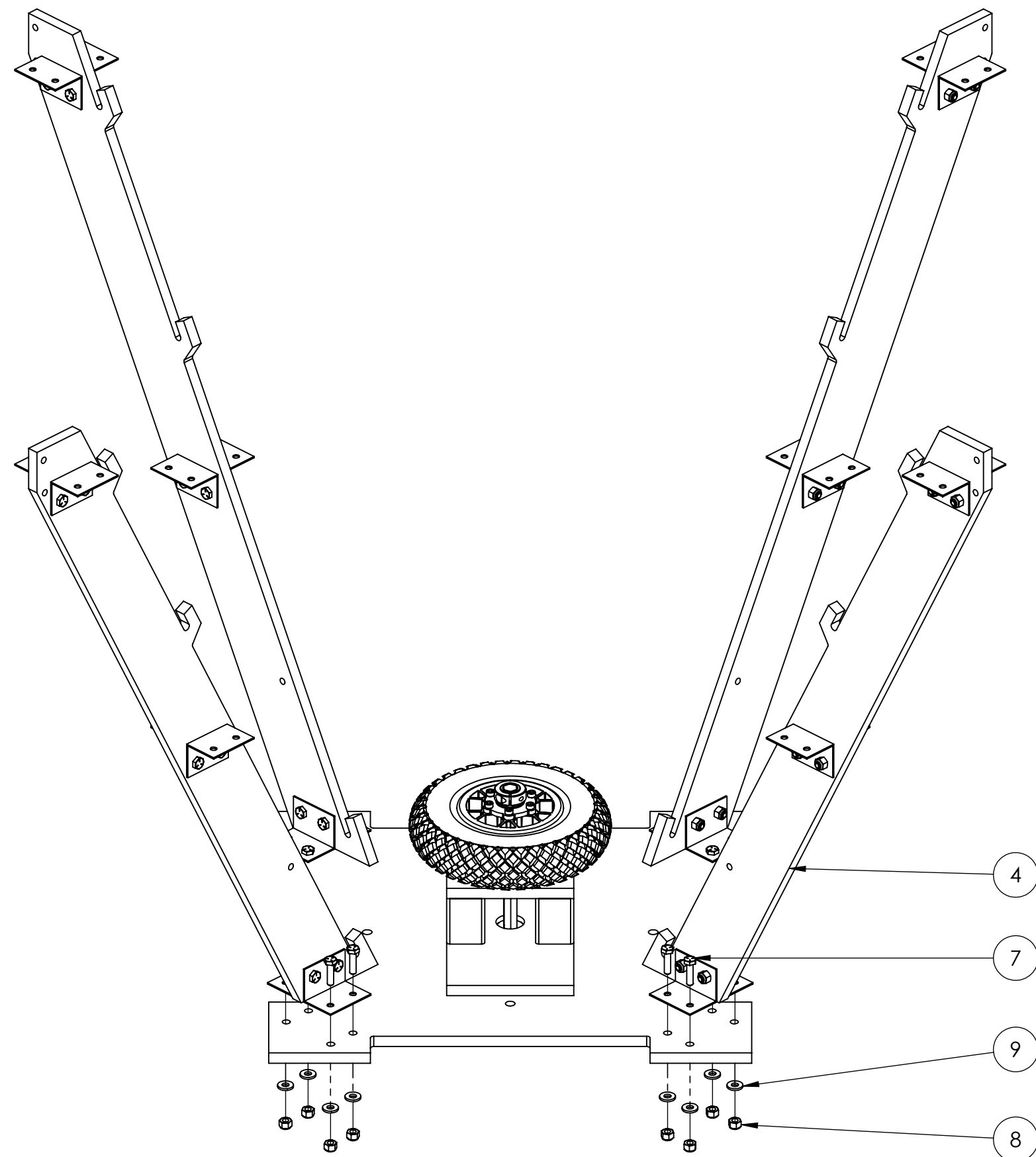


Step 1





1. Align 6 to 1 as shown. Wheel should be able to freely rotate. If not, hole in 1 may need to be enlarged.
2. Connect using 1" long screws. It is recommended to use 4x screws.

Step 2



1. Align 4x 4 to Step 1, as shown.
2. Connect using 4x 7, 4x 9, and 4x 8 per 4.

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>    DO NOT SCALE DRAWING	TEAM	NAME	DATE	 
	DRAWN	CO	1/3/2022	
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			
TITLE: Hub - Complex Build - Upper Hub Assembly				
SIZE		DWG. NO.		REV
C		TE-22190		
SCALE: 1:5			SHEET 3 OF 5	

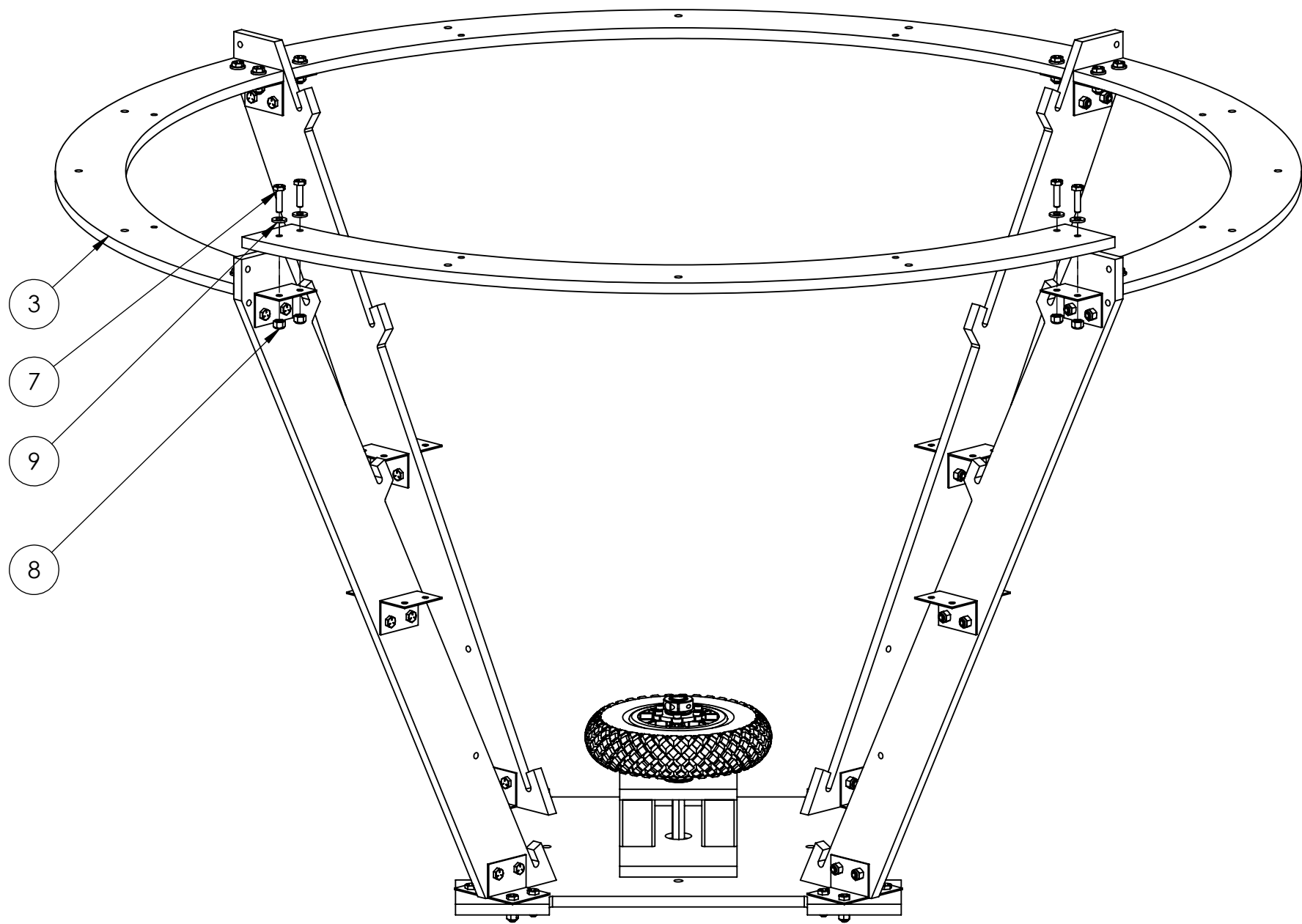
D

C

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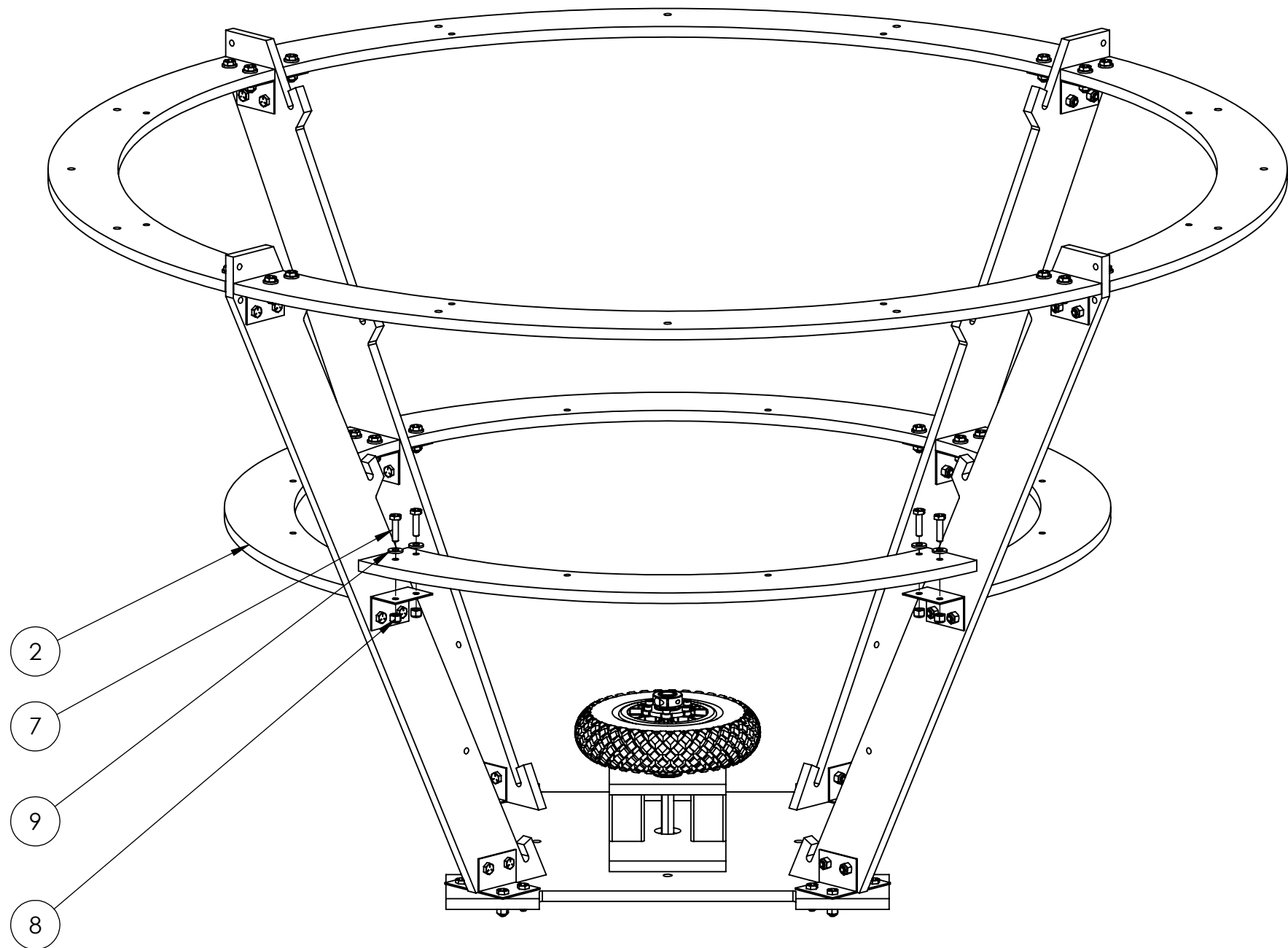
A

Step 3





1. Align 4x (3) to Step 2, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (3).

Step 4



1. Align 4x (2) to Step 3, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (2).

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE
	DRAWN	CO	1/3/2022
	PROPRIETARY AND CONFIDENTIAL		
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.		
MATERIAL/FINISH:	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.		
DO NOT SCALE DRAWING			



TITLE: Hub - Complex Build - Upper Hub Assembly

SIZE

DWG. NO.

REV

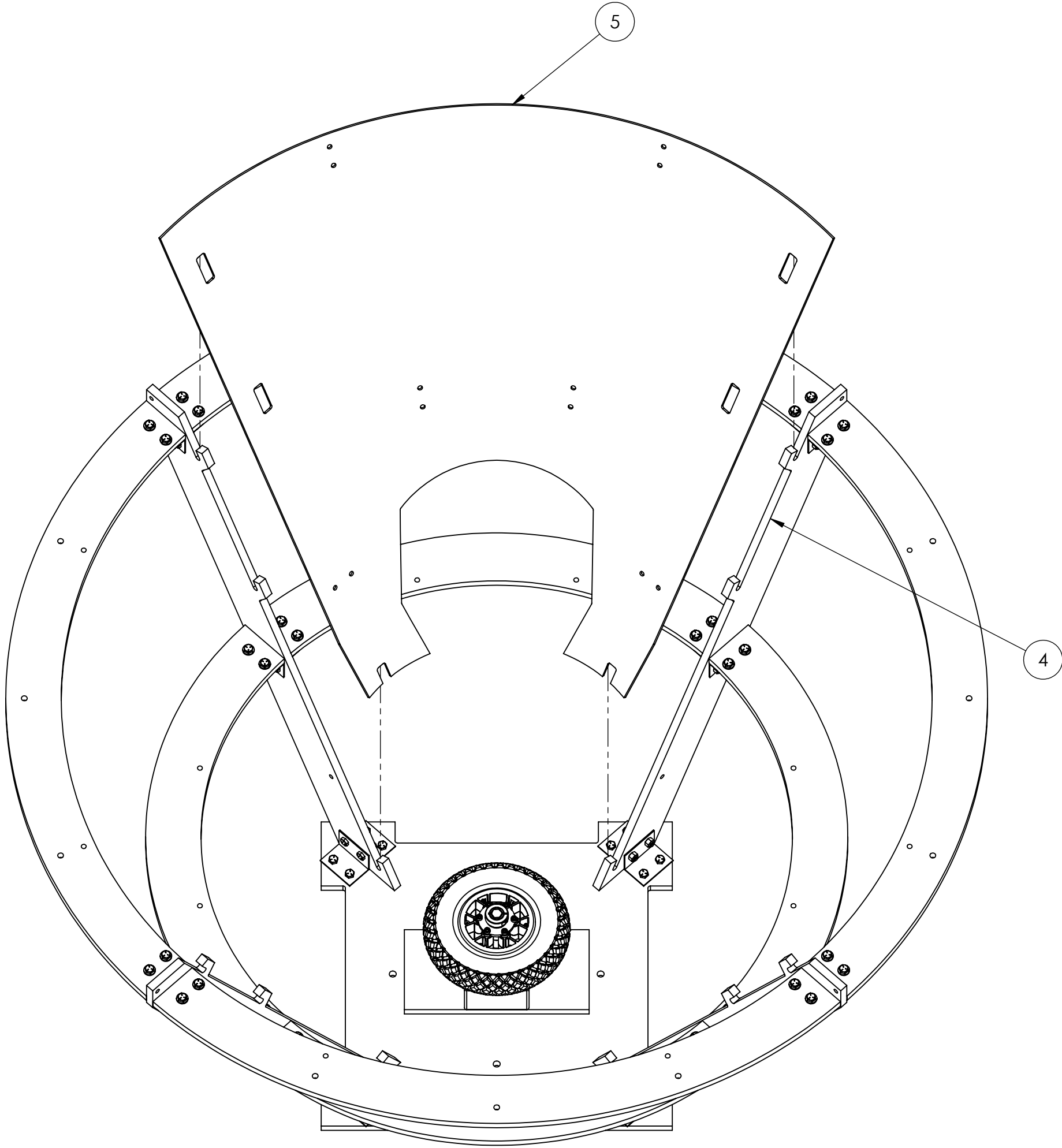
C

TE-22190

SCALE: 1:6

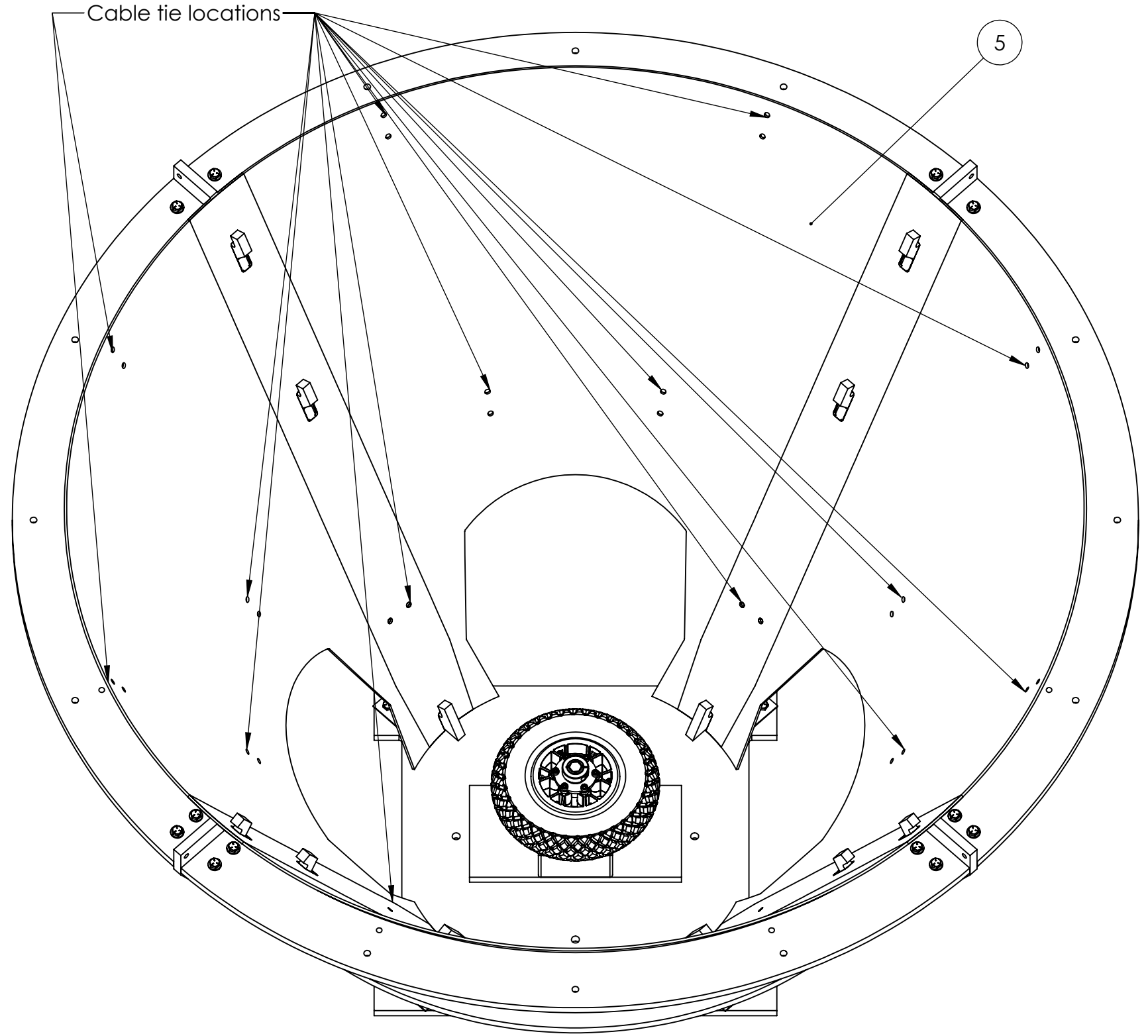
SHEET 4 OF 5

Step 5





1. Attach (5) to assembly. Do this by bending (5) while lowering into position. All rectangular cutouts (6x) in (5) need to align with hooks on (4). Note: It will be helpful to have multiple people to help with alignment.
2. Press (5) down firmly to ensure it is fully seated.

Step 6



1. Continue the process described in Step 4 by working around in a circular pattern until there is a total of 4x (5) installed. The orientation of overlaps should not matter (i.e. there is no need to worry about installing in a clockwise or counterclockwise manner). Note: It will be more difficult to seat (5) in overlapped locations - the final piece will be the most difficult.
2. Secure (5) to assembly using 20x 50 lb cable ties.

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div><div>FIRST ROBOTICS COMPETITION</div><div>Modeling Solutions Partner</div></div> <div>TITLE: Hub - Complex Build - Upper Hub Assembly</div> <div><div>SIZE</div><div>C</div><div>DWG. NO.</div><div>TE-22190</div><div>REV</div></div> <div><div>SCALE: 1:6</div><div>SHEET 5 OF 5</div></div>
	DRAWN	CO	1/3/2022	
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING				

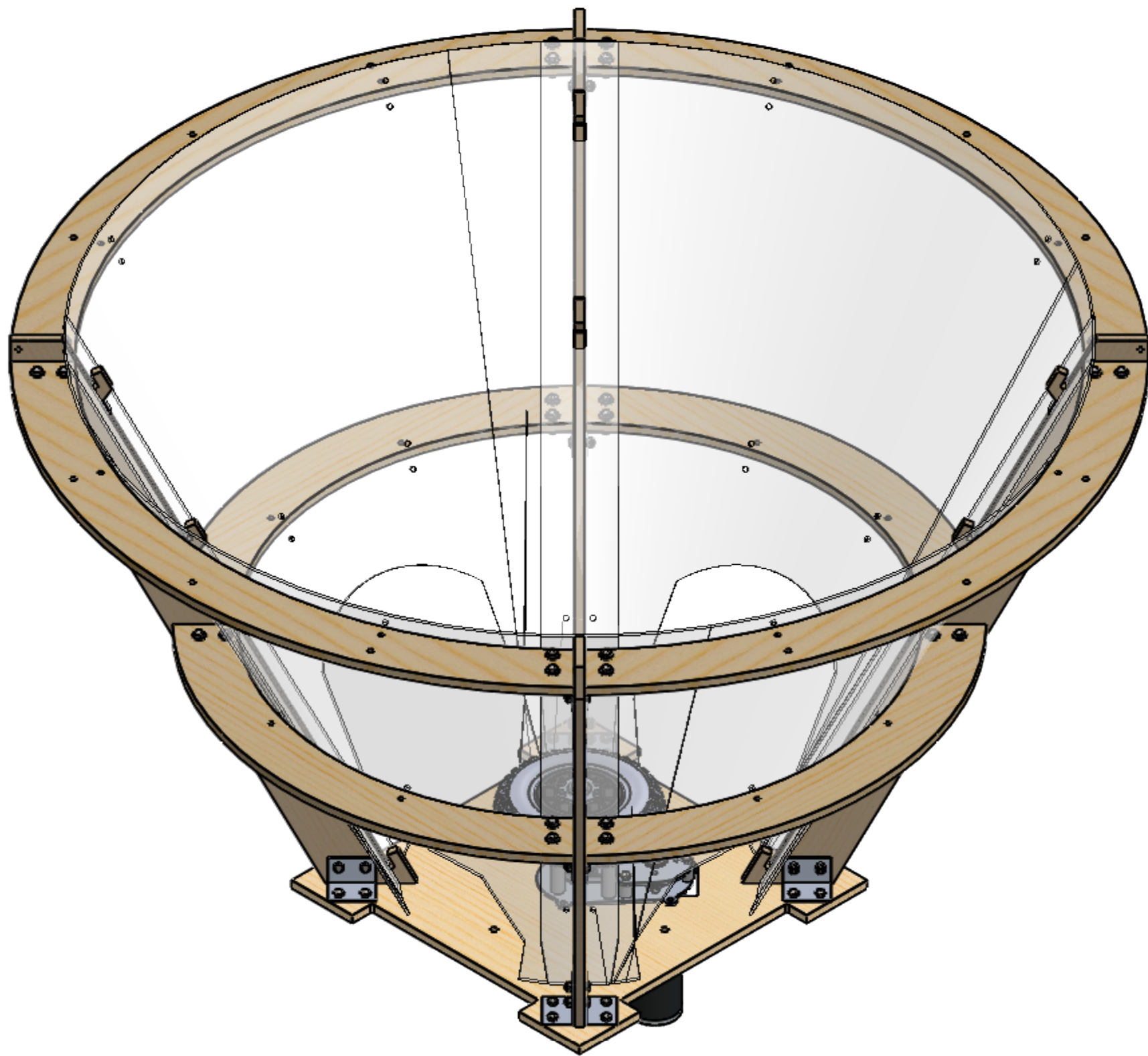
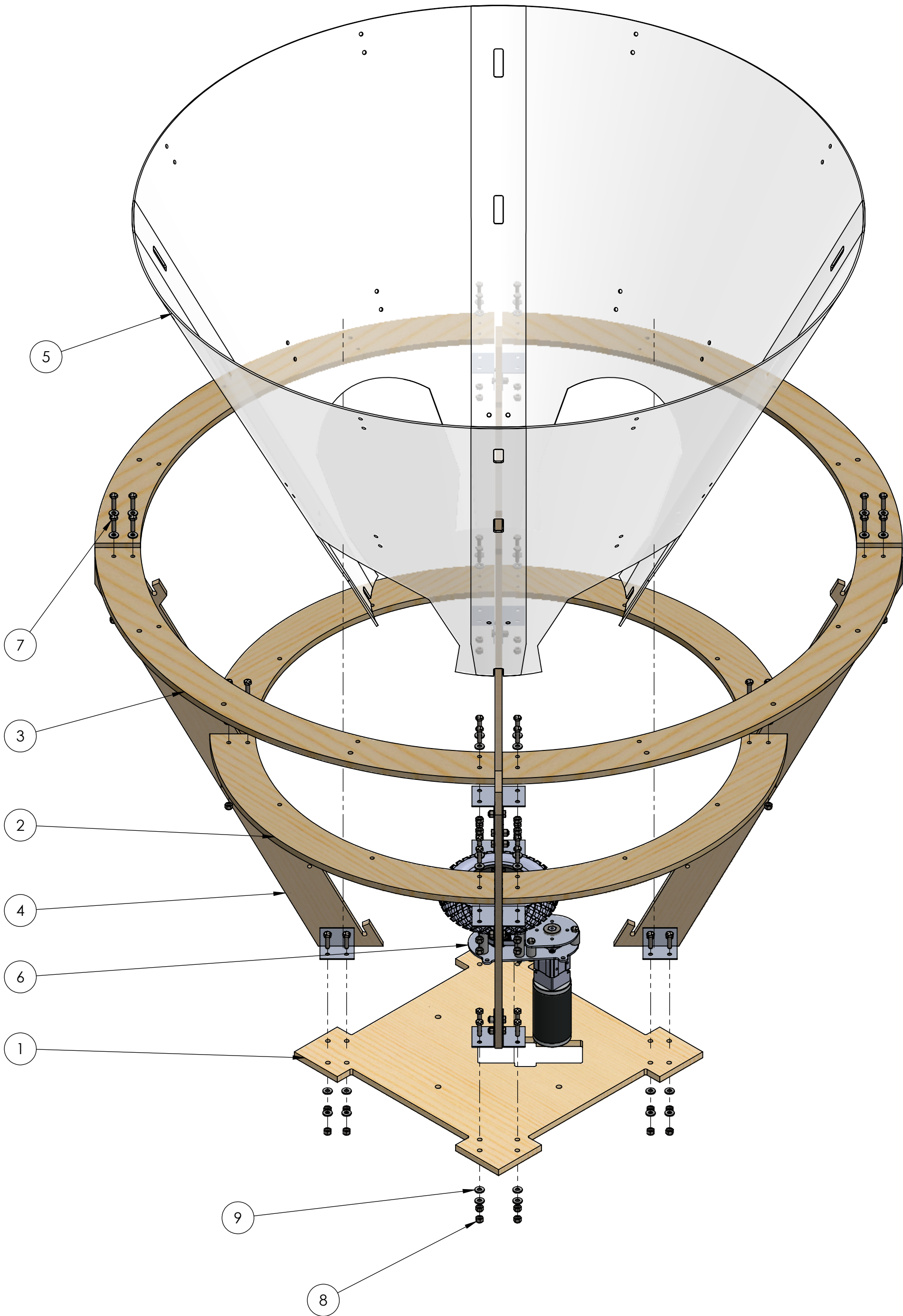


D

C

B

A



Hardware Needed:  
#8 x 0.5" Long Screw - Qty 4  
1/4" Flat Washer - Qty 4  
50 lb. cable ties - Qty 20

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22191_AM-4674	Hub - Complex Build - Upper Hub Base for AM Agitator AM-4674	1
2	TE-22193	Hub - Complex Build - Upper Hub Lower Ring	4
3	TE-22194	Hub - Complex Build - Upper Hub Upper Ring	4
4	TE-22196	Hub - Complex Build - Upper Hub Vertical Support and Bracket Assembly	4
5	TE-22197	Hub - Complex Build - Upper Hub Plastic	4
6	AM-4674	AM Active Assembly	1
7	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 3/4" long, fully threaded	48
8	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	48
9	washer_flat_.25	Flat Washer for 1/4" Screw	48

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM	NAME	DATE
DRAWN	CO	1/3/2022

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COMMENTS:

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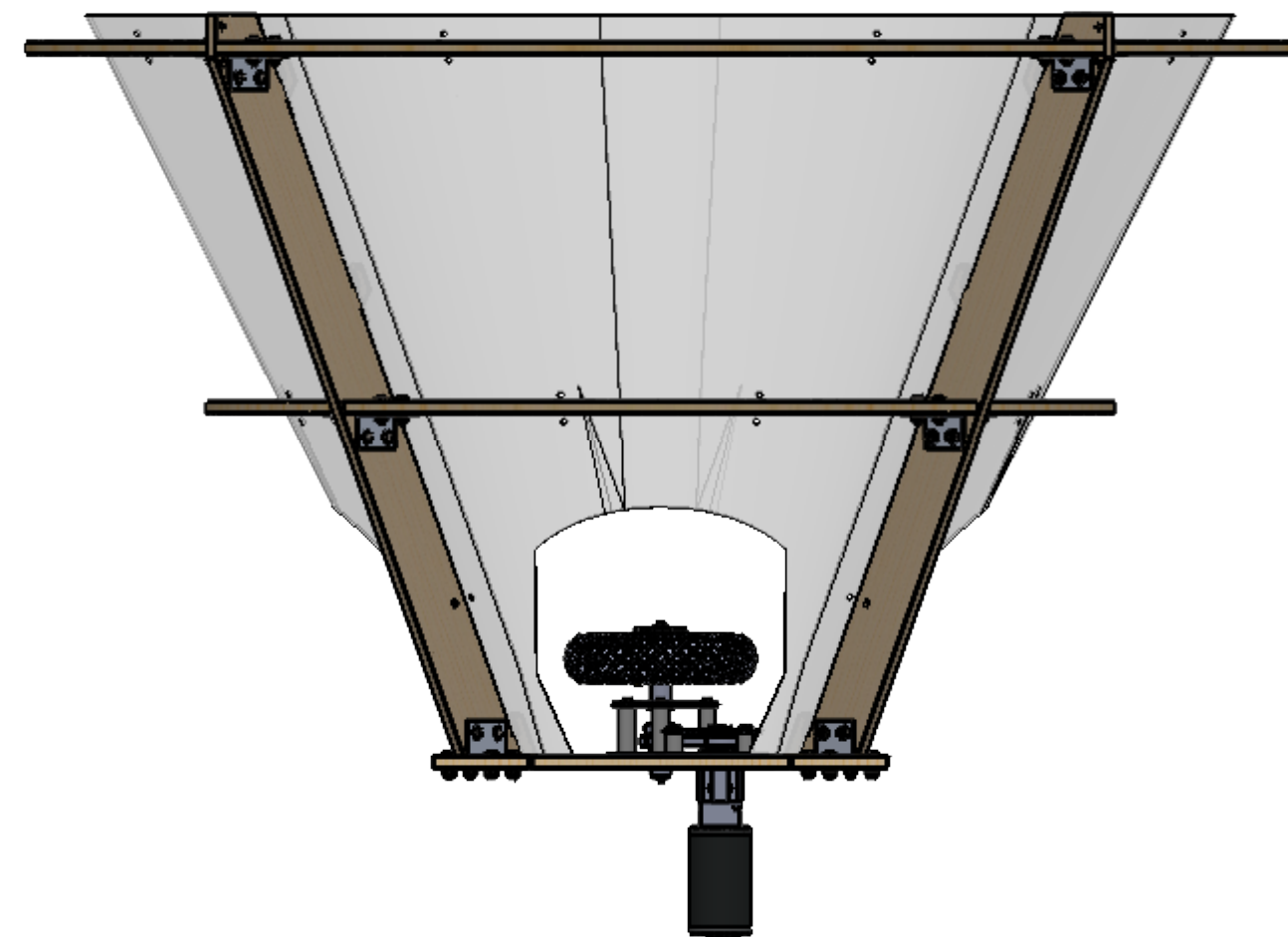
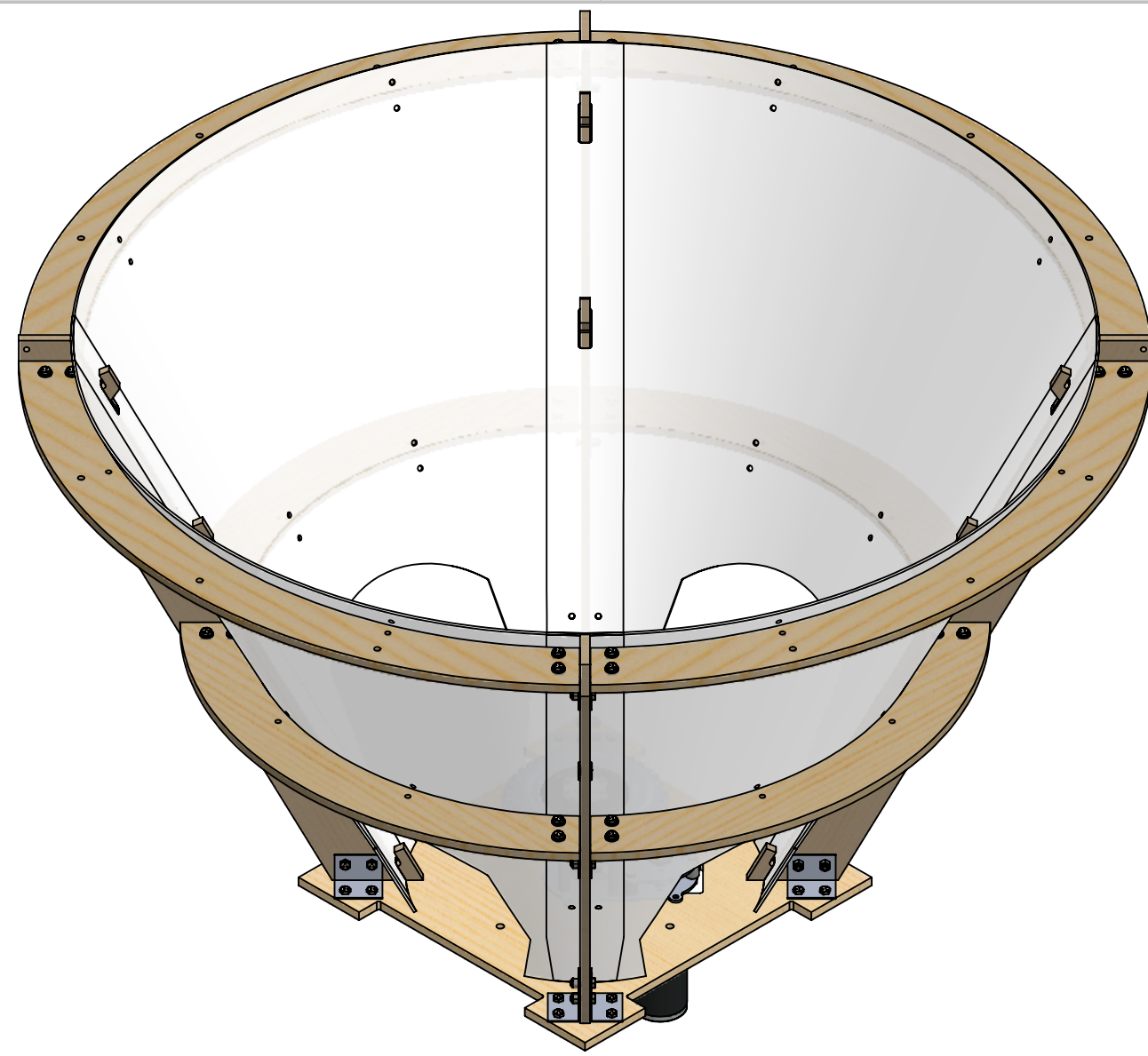
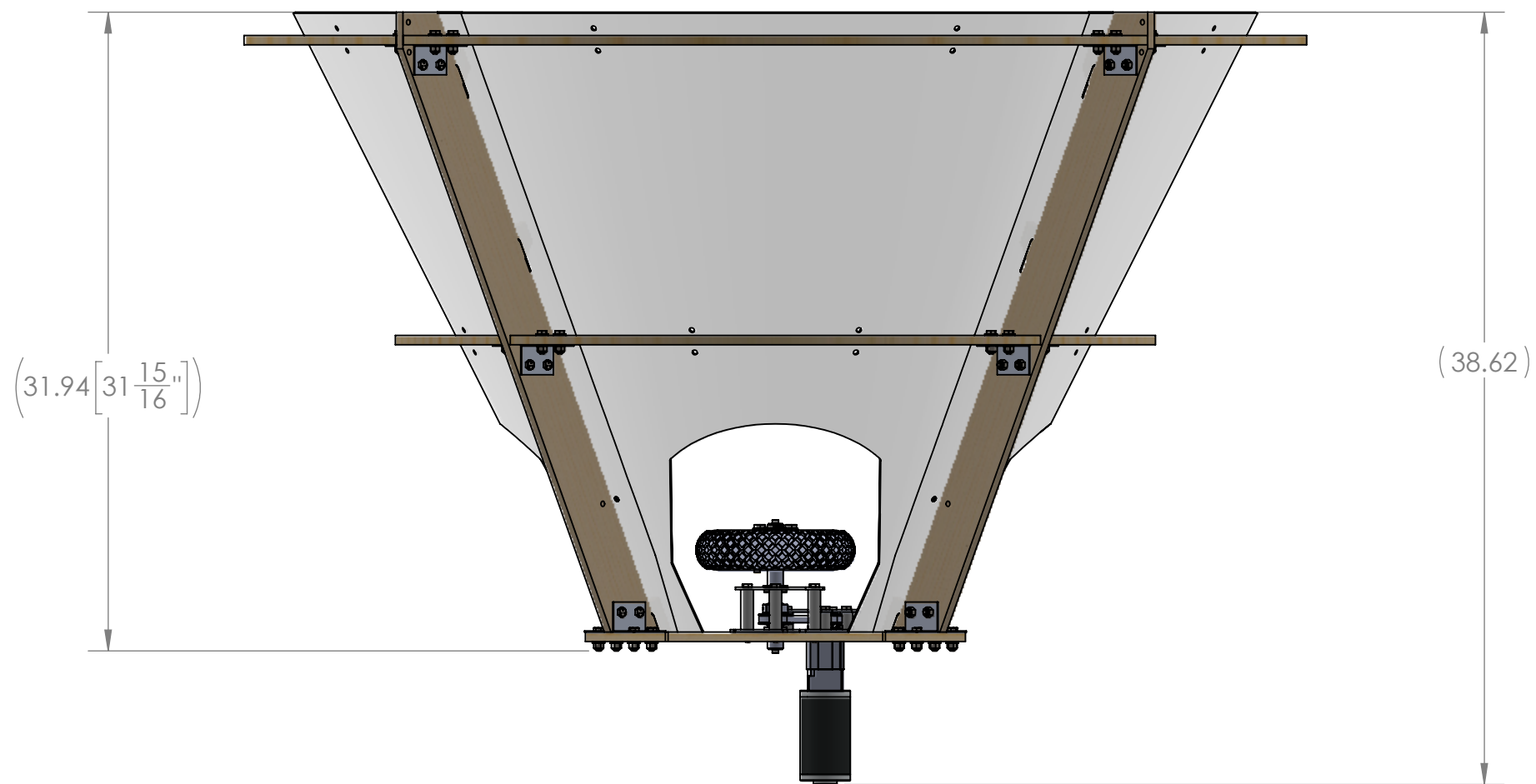
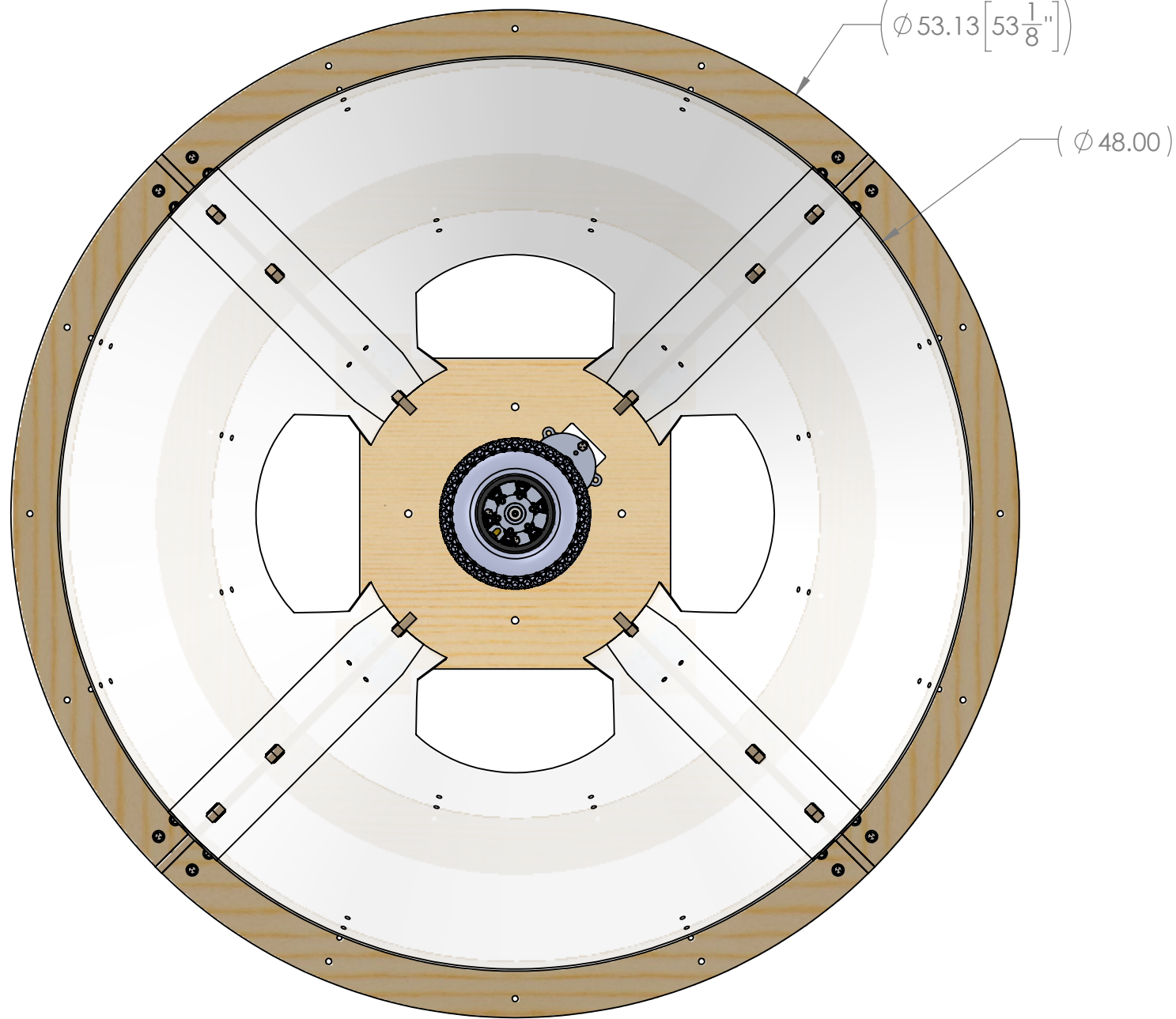




TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674

SIZE	DWG. NO.	REV
C	TE-22190-AMActive	

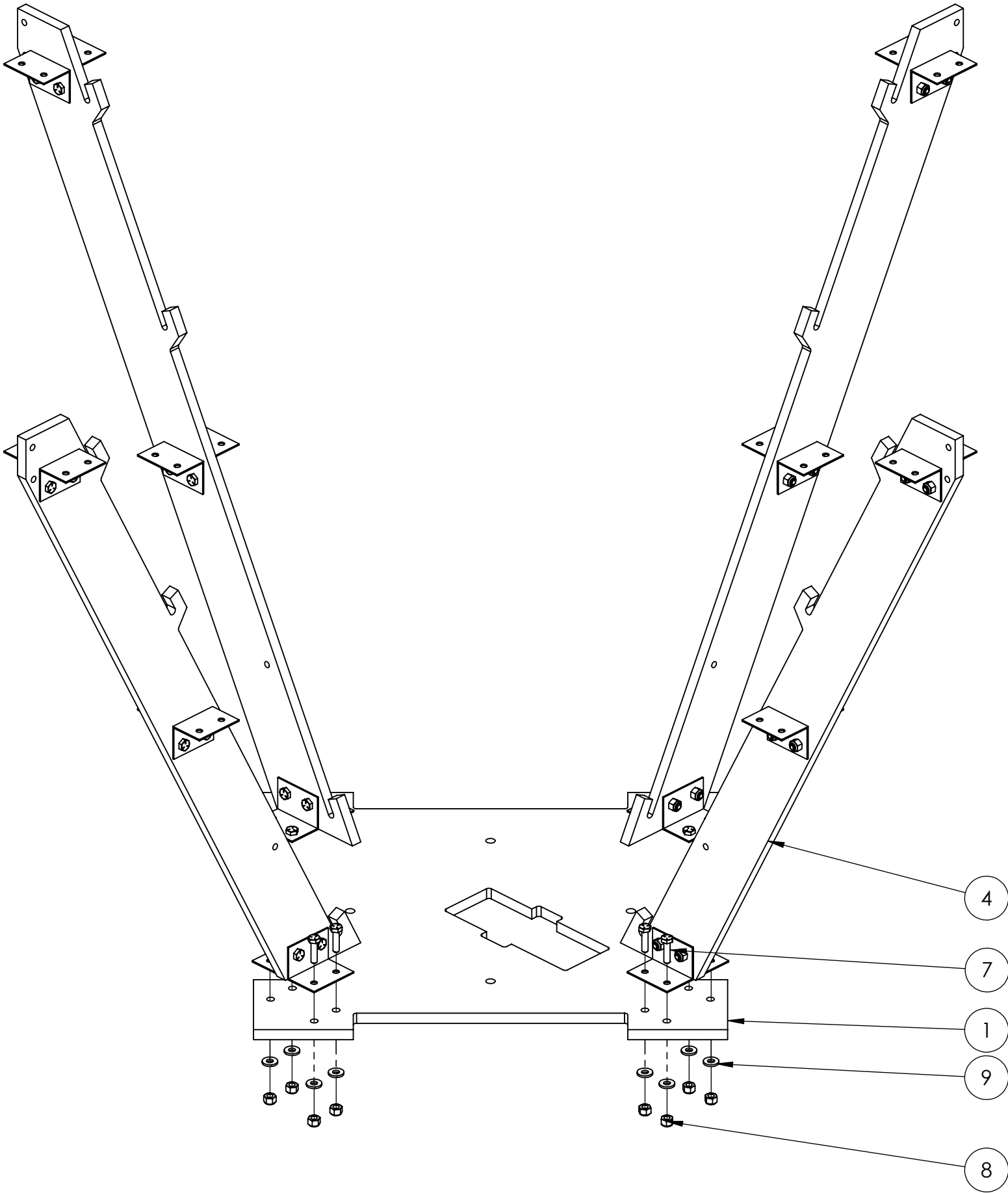
SCALE: 1:6 SHEET 1 OF 6





UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>     DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	CO	1/3/2022		
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674	
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE <b>C</b>	DWG. NO. TE-22190-AMActive REV
SCALE: 1:8		SHEET 2 OF 6			

Step 1



- 1. Align 4x 4 to 1, as shown.
- 2. Connect using 4x 7, 4x 9, and 4x 8 per 4.

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM

NAME

DATE

DRAWN

CO

1/3/2022

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COMMENTS:

REMOVE ALL BURRS AND SHARP EDGES.



FIRST  
ROBOTICS  
COMPETITION

SOLIDWORKS  
Modeling Solutions Partner

TITLE: Hub - Complex Build -  
Upper Hub Assembly  
for AM Agitator AM-  
4674

SIZE

DWG. NO.

REV

C

TE-22190-AMActive

SCALE: 1:5

SHEET 3 OF 6



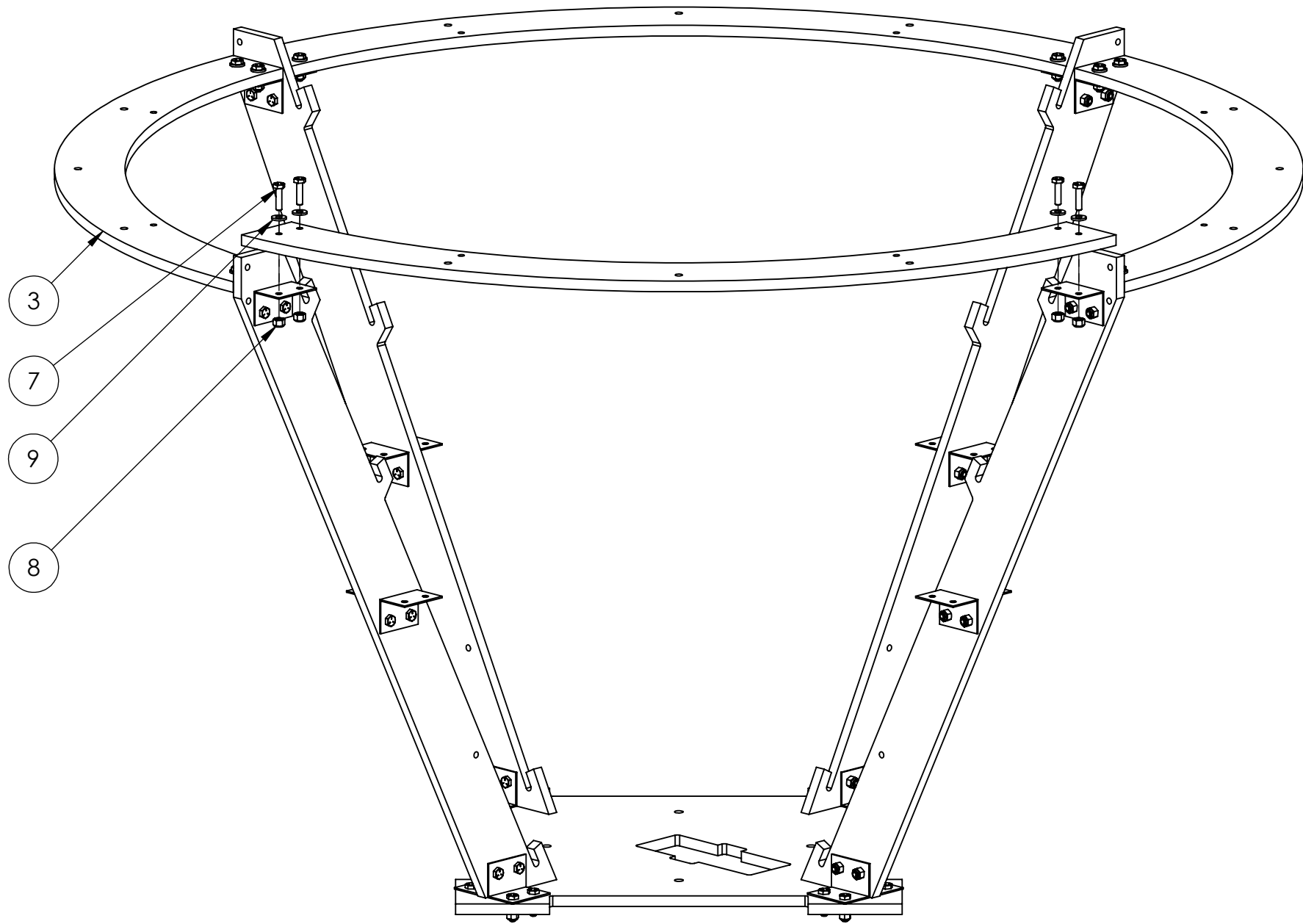
D

C

B

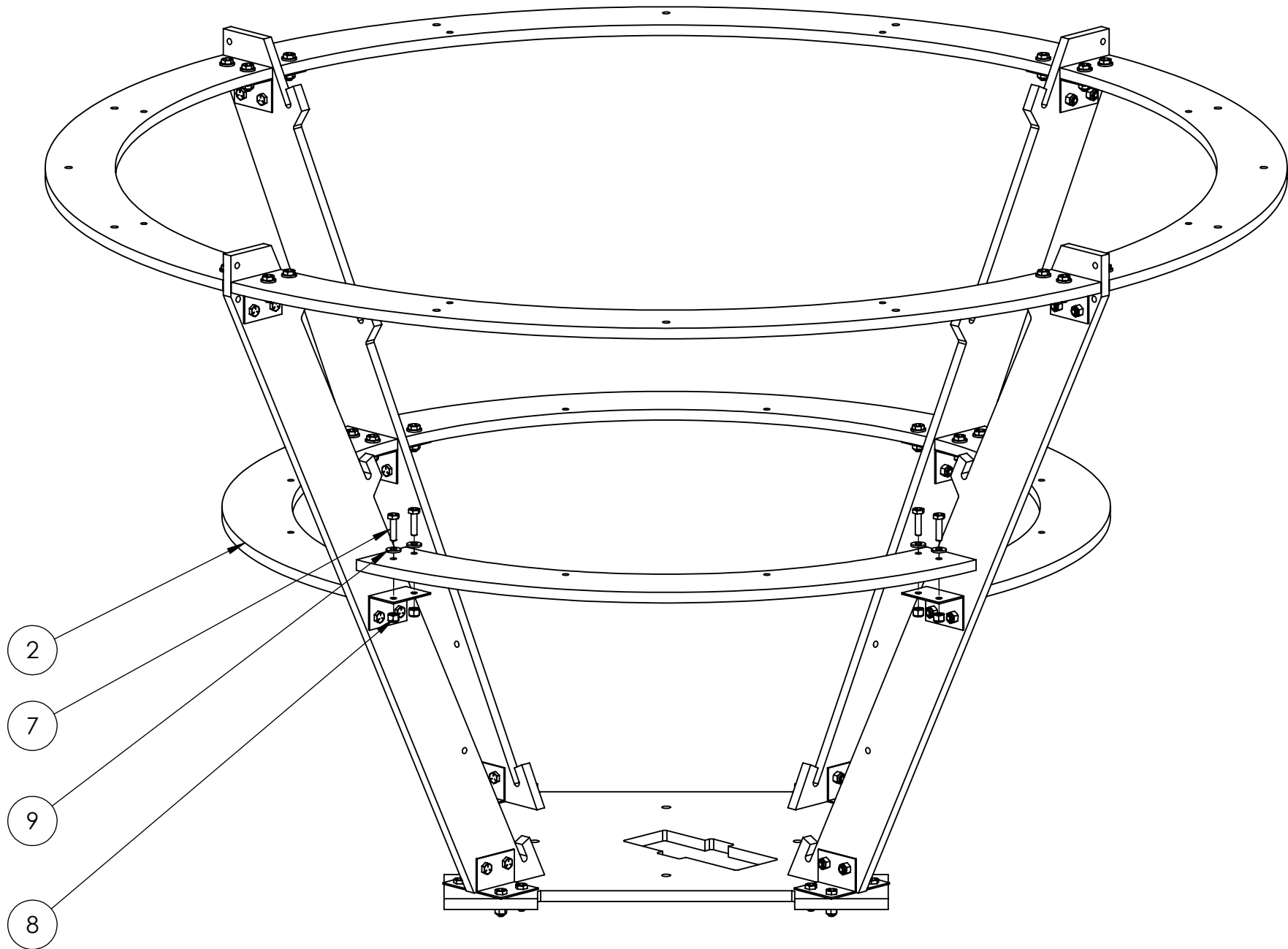
A

Step 2





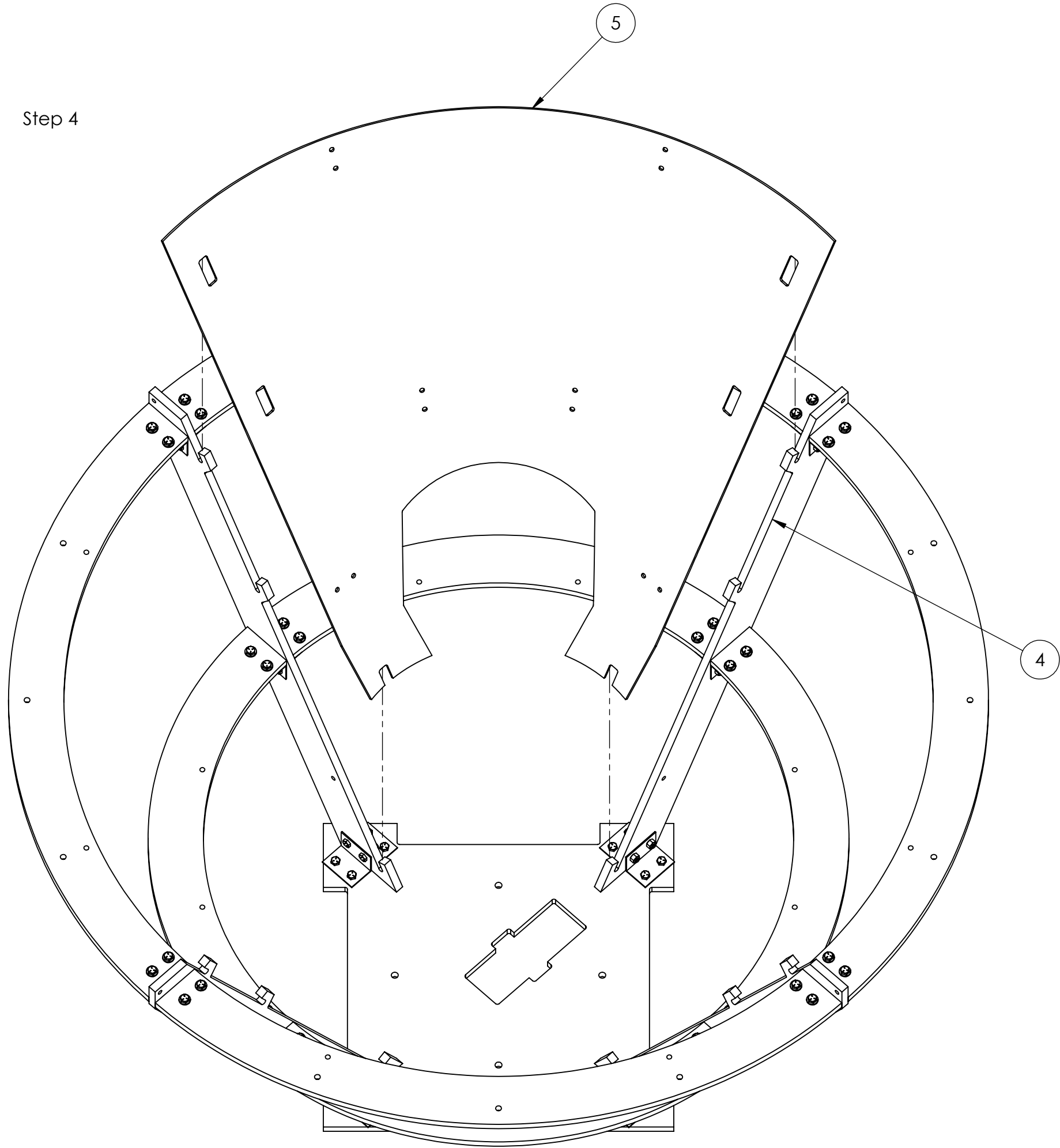
1. Align 4x (3) to Step 1, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (3).

Step 3

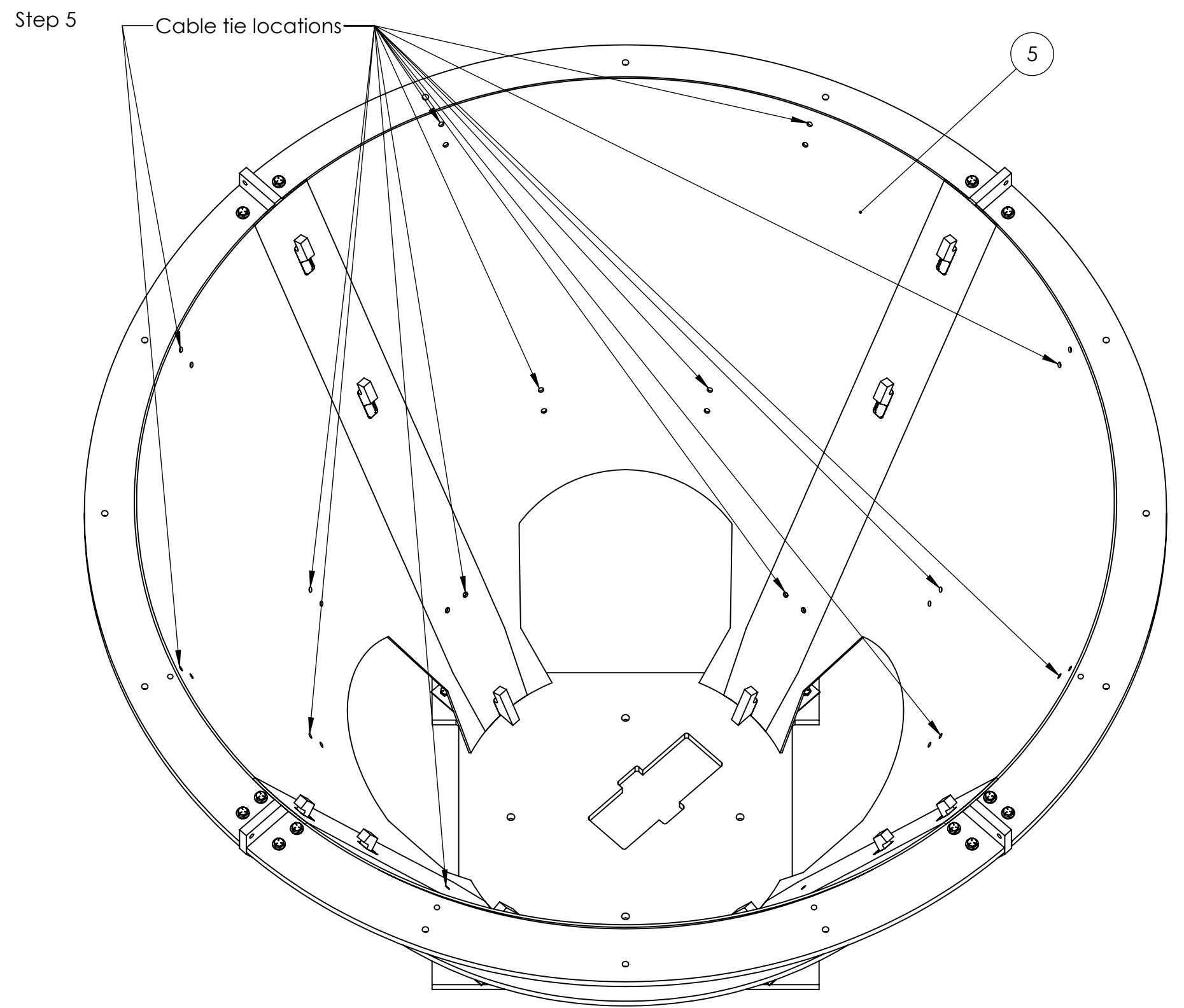


1. Align 4x (2) to Step 2, as shown.
2. Connect using 4x (7), 4x (9), and 4x (8) per (2).



UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div> <div>TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674</div> <div>SIZE DWG. NO. REV</div> <div>C TE-22190-AMActive</div> <div>SCALE: 1:6 SHEET 4 OF 6</div>
	DRAWN	CO	1/3/2022	
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			
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MATERIAL/FINISH:	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING				



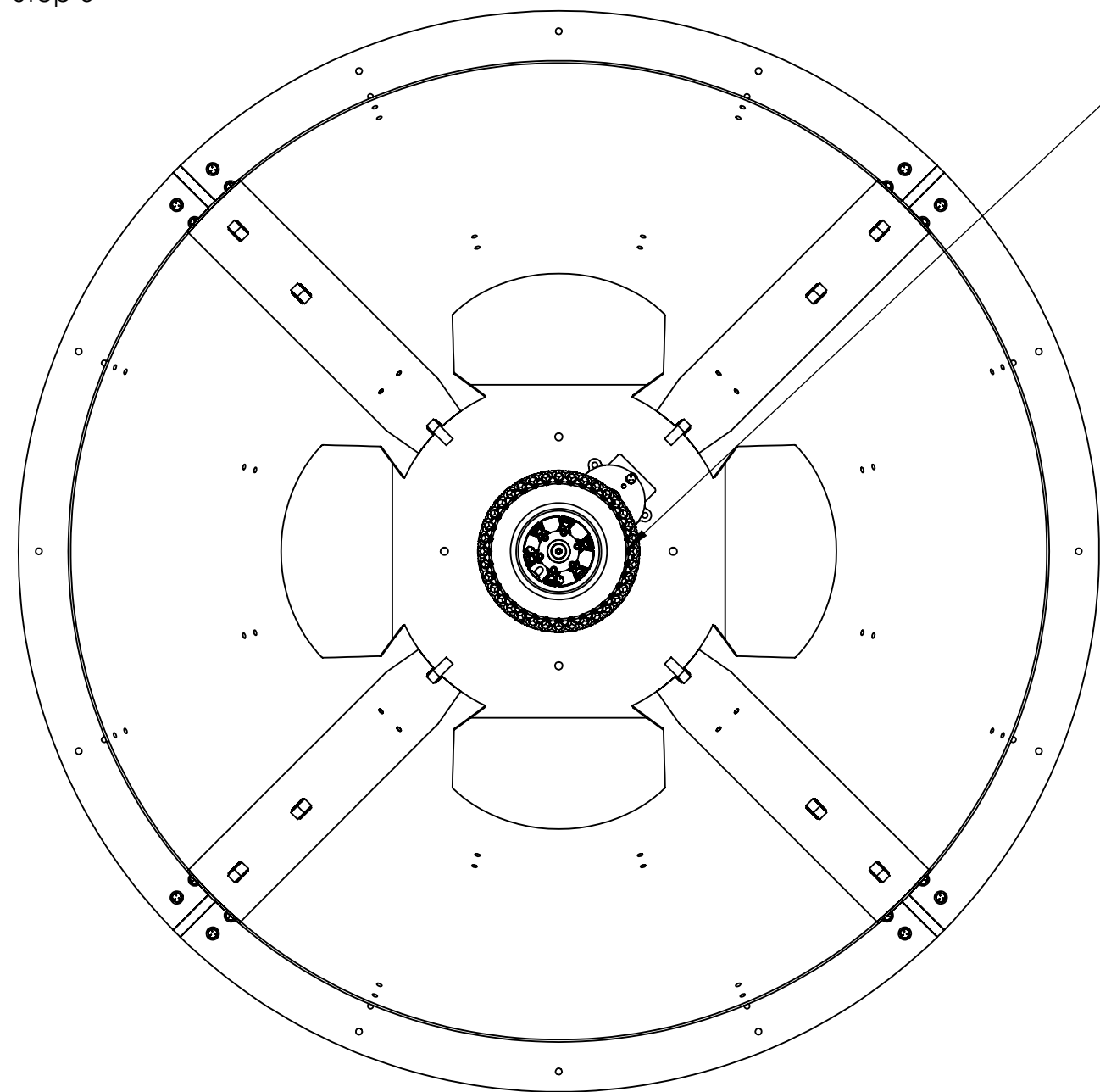
1. Align 1x (5) to Step 3. Do this by bending (5) while lowering into position. The cutouts (6x) in (5) need to align with hooks on (4). Note: It will be helpful to have multiple people to aid with alignment.
2. Press (5) down firmly to ensure it is fully seated.



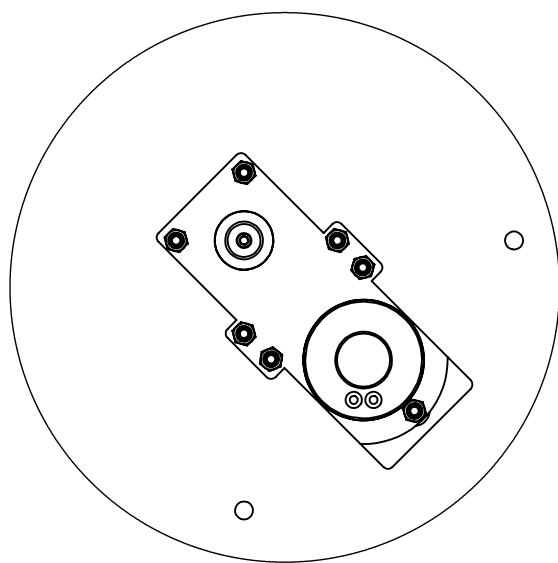
1. Continue the process described in Step 4 by working around in a circular pattern until there is a total of 4x (5) installed. The orientation of overlaps should not matter (i.e. there is no need to worry about installing in a clockwise or counterclockwise manner). Note: It will be more difficult to seat (5) in overlapped locations - the final piece will be the most difficult.
2. Secure (5) to assembly using 50 lb cable ties, as shown.

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  MATERIAL/FINISH:   DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	CO	1/3/2022		
	PROPRIETARY AND CONFIDENTIAL			TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674	
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COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
			C	TE-22190-AMActive	
			SCALE: 1:6		SHEET 5 OF 6

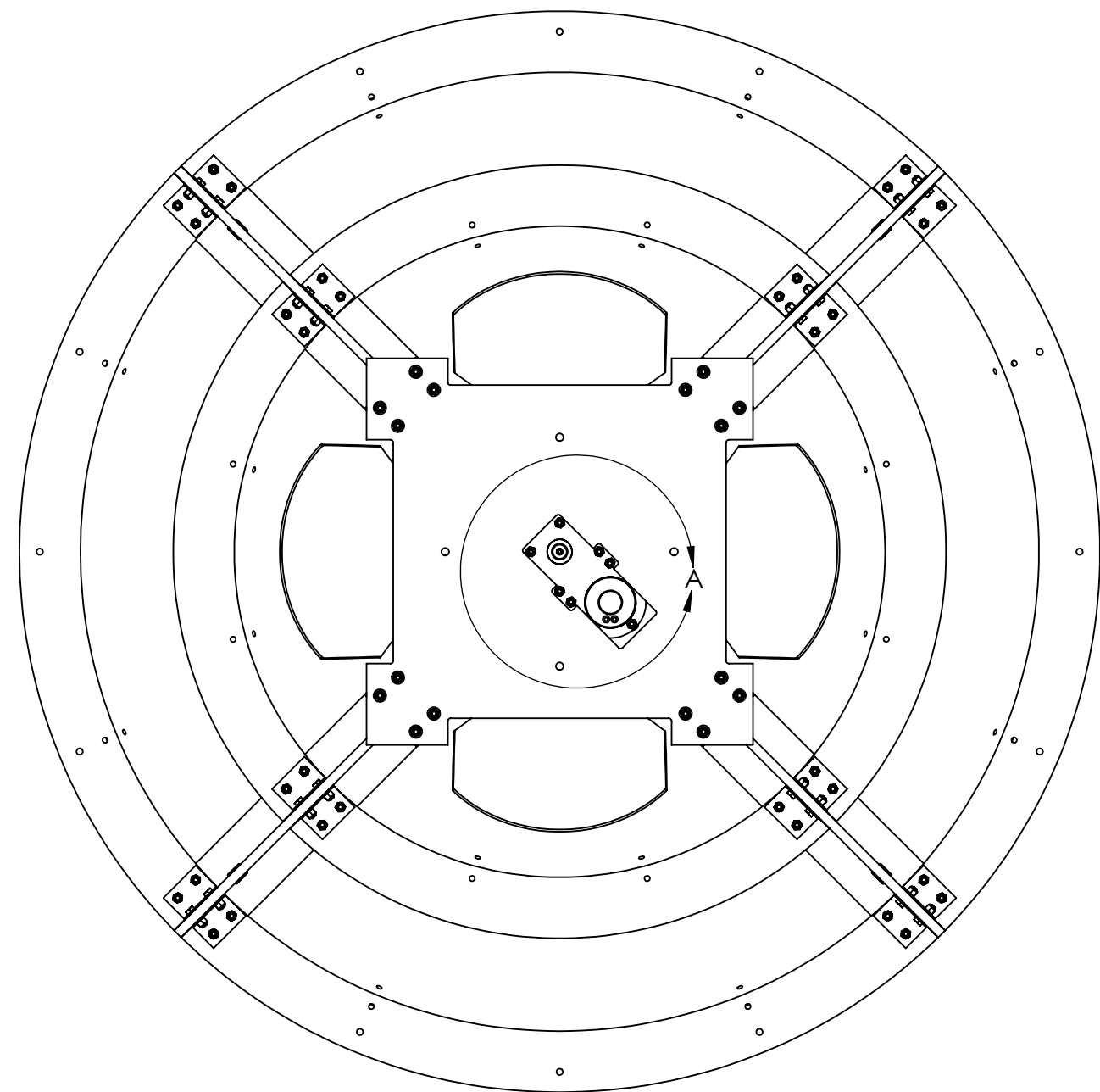
Step 6



Top View

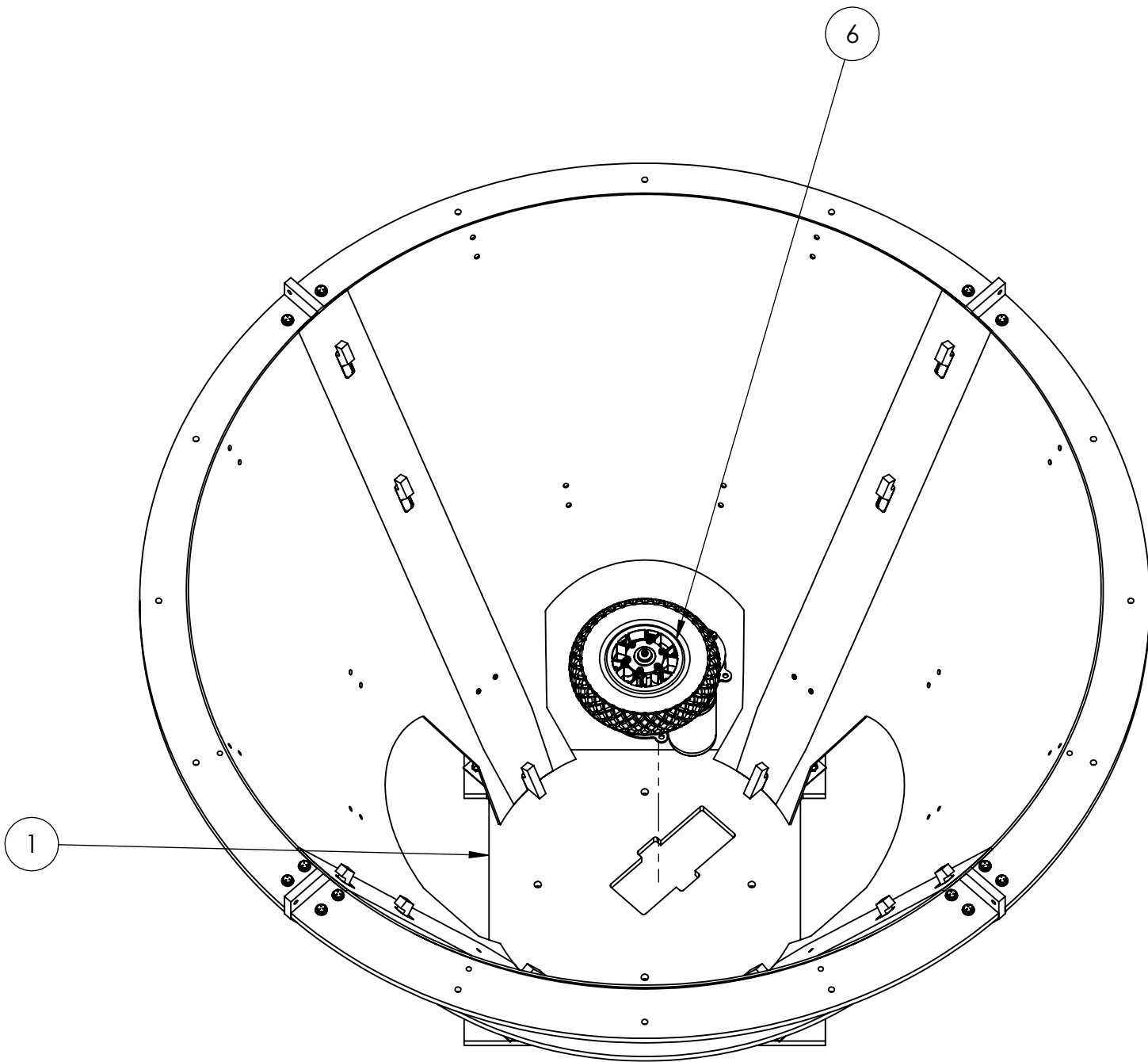


DETAIL A  
SCALE 1 : 4





Bottom View

Wheel may need to be temporarily removed from 6 to fasten assembly down. Wheel should end up centered in assembly.



Note - completion of this step will make installation of TE-22190-AMActive into TE-22100 more difficult. However, this step will be more difficult to complete when installed at the TE-22100 level. Consider your resources and proceed accordingly.

- Align 6 to 1, as shown. Bolts in 6 should align with cutout in 1, as shown in Detail A.
- Connect using 4x 0.5" long screws paired with and inserted through 4x 1/4" flat washers.  
Alternatively - drill holes in 1 and use 4x bolts with nuts (Nylock recommended) to fasten.

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>   DO NOT SCALE DRAWING	TEAM	NAME	DATE	  TITLE: Hub - Complex Build - Upper Hub Assembly for AM Agitator AM-4674	
	DRAWN	CO	1/3/2022		
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	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			C TE-22190-AMActive	
SCALE: 1:8			SHEET 6 OF 6		

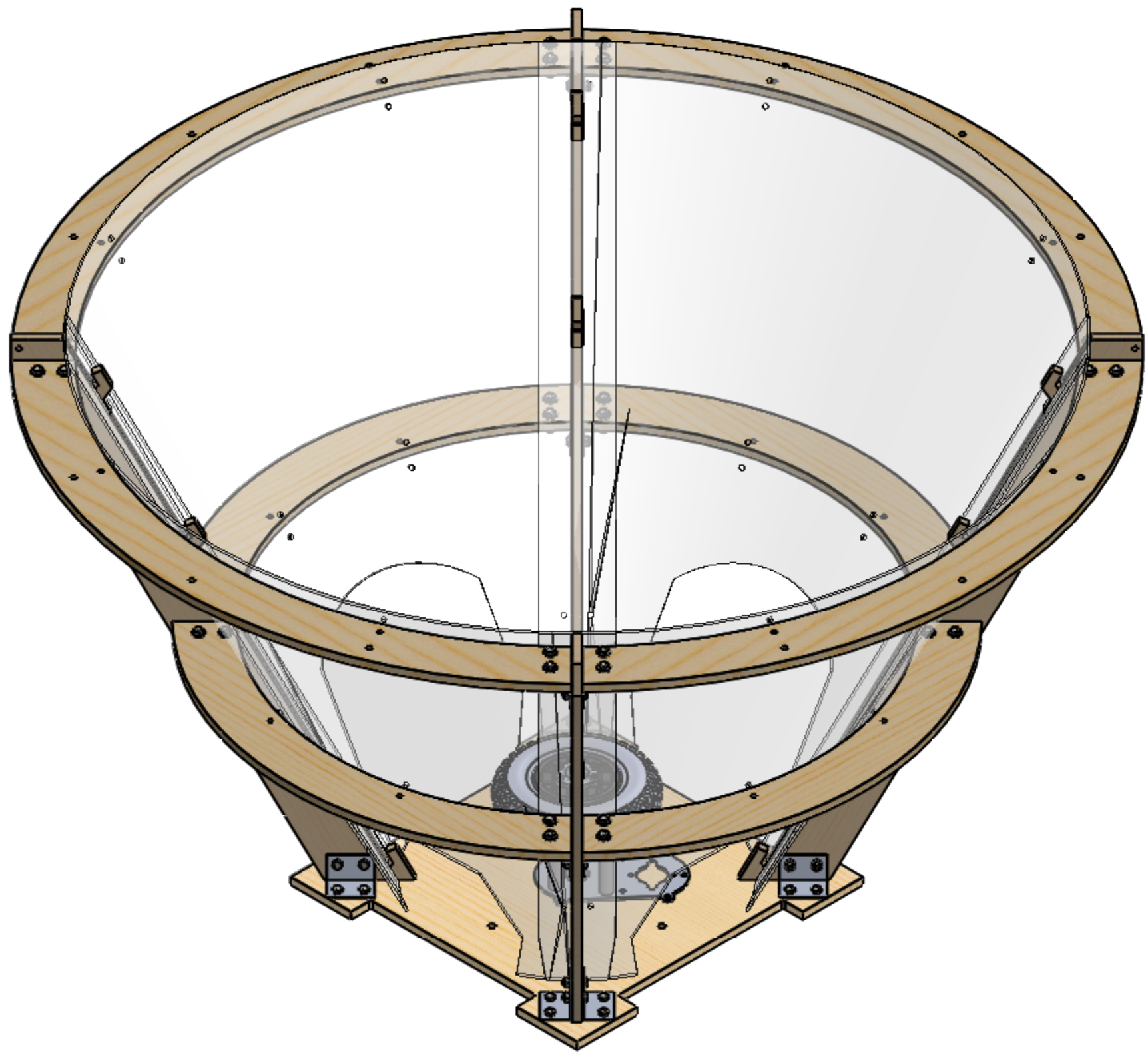
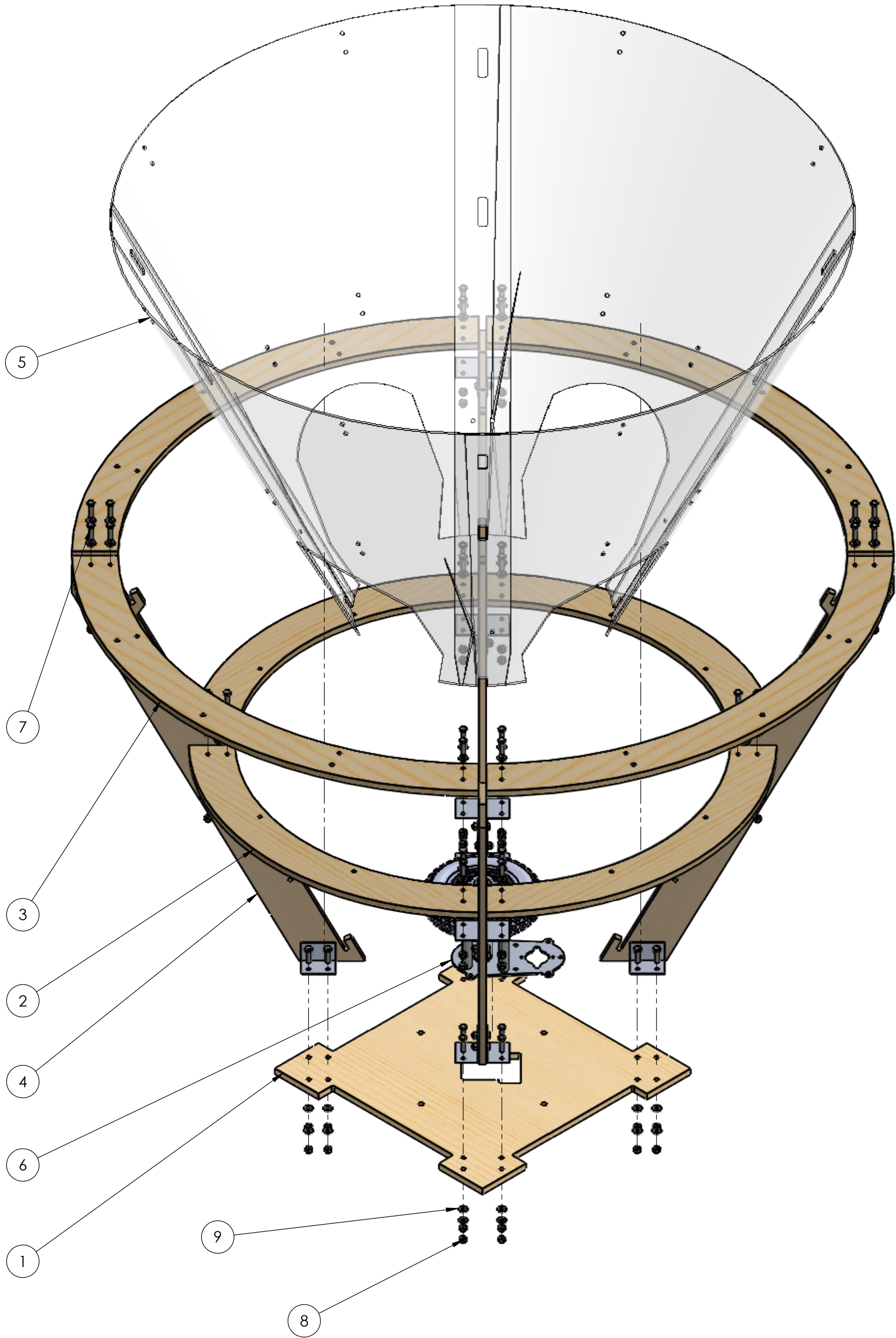


D

C

B

A



Hardware Needed:  
#8 x 0.5" Long Screw - Qty 4  
1/4" Flat Washer - Qty 4  
50 lb. cable ties - Qty 20

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22191_AM-4673	Hub - Complex Build - Upper Hub Base for AM Agitator AM-4673	1
2	TE-22193	Hub - Complex Build - Upper Hub Lower Ring	4
3	TE-22194	Hub - Complex Build - Upper Hub Upper Ring	4
4	TE-22196	Hub - Complex Build - Upper Hub Vertical Support and Bracket Assembly	4
5	TE-22197	Hub - Complex Build - Upper Hub Plastic	4
6	AM-4673	Passive High Agitator	1
7	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 3/4" long, fully threaded	48
8	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	48
9	washer_flat_.25	Flat Washer for 1/4" Screw	48

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$

MATERIAL/FINISH:

DO NOT SCALE DRAWING

TEAM	NAME	DATE
DRAWN	CO	1/3/2022

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COMMENTS:

REMOVE ALL BURRS AND SHARP EDGES.



TITLE: Hub - Complex Build - Upper Hub Assembly  
AM Agitator AM-4673

SIZE	DWG. NO.	REV
C	TE-22190-AMPassive	

SCALE: 1:6 SHEET 1 OF 5



4

3

2

1

D

D

C

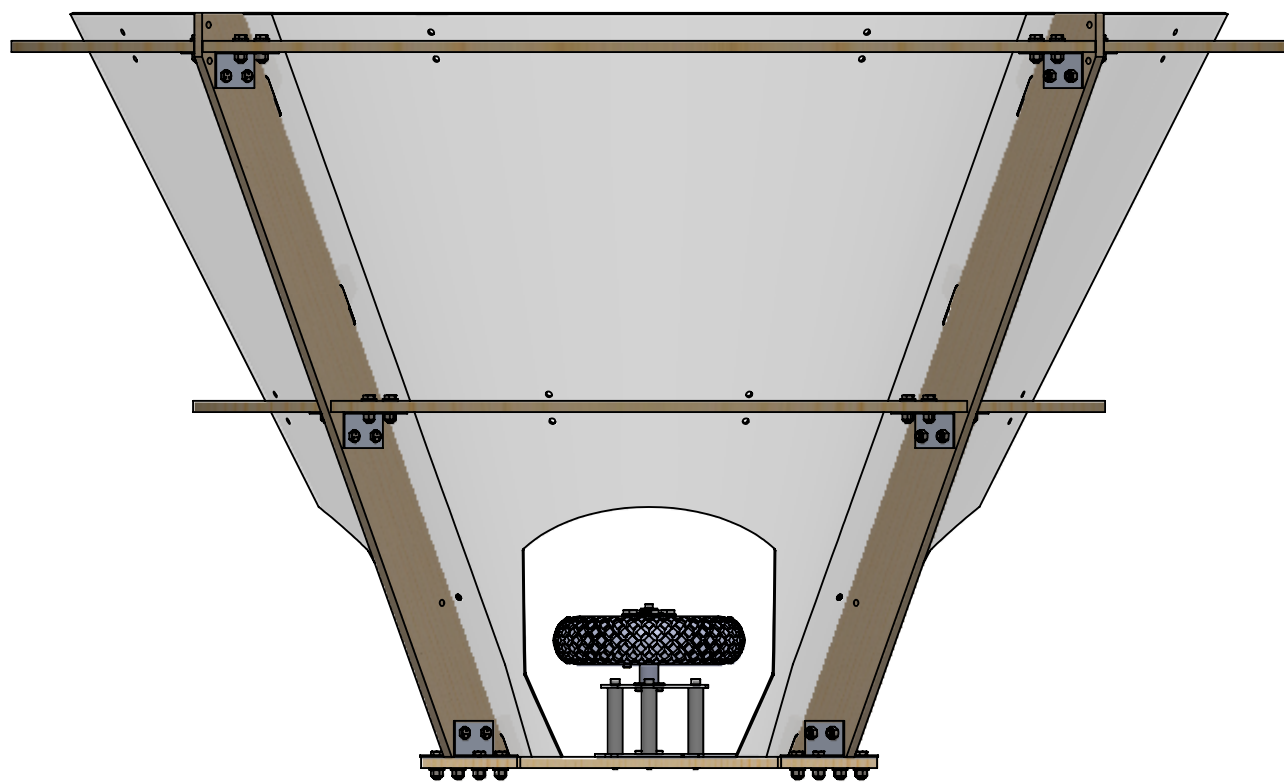
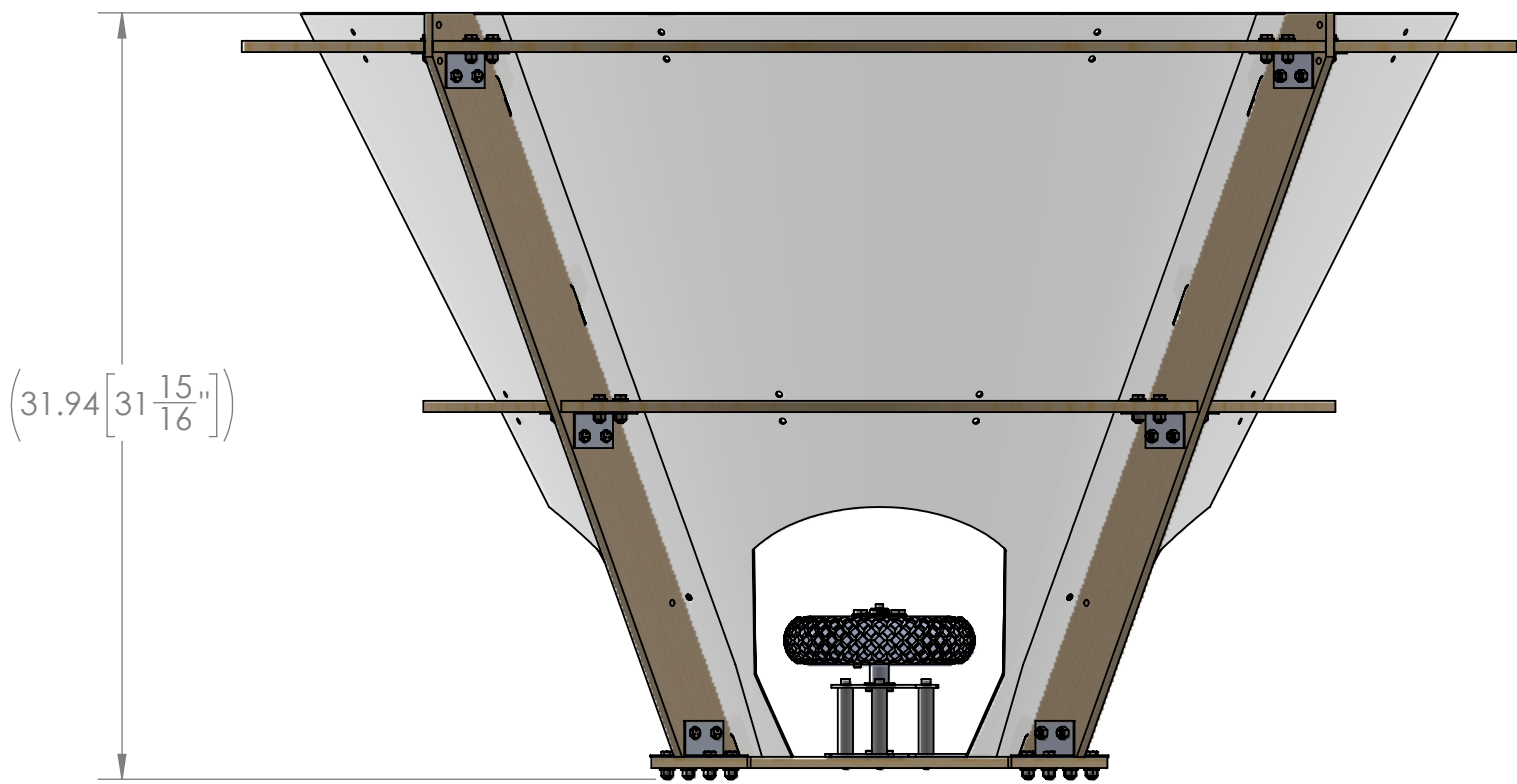
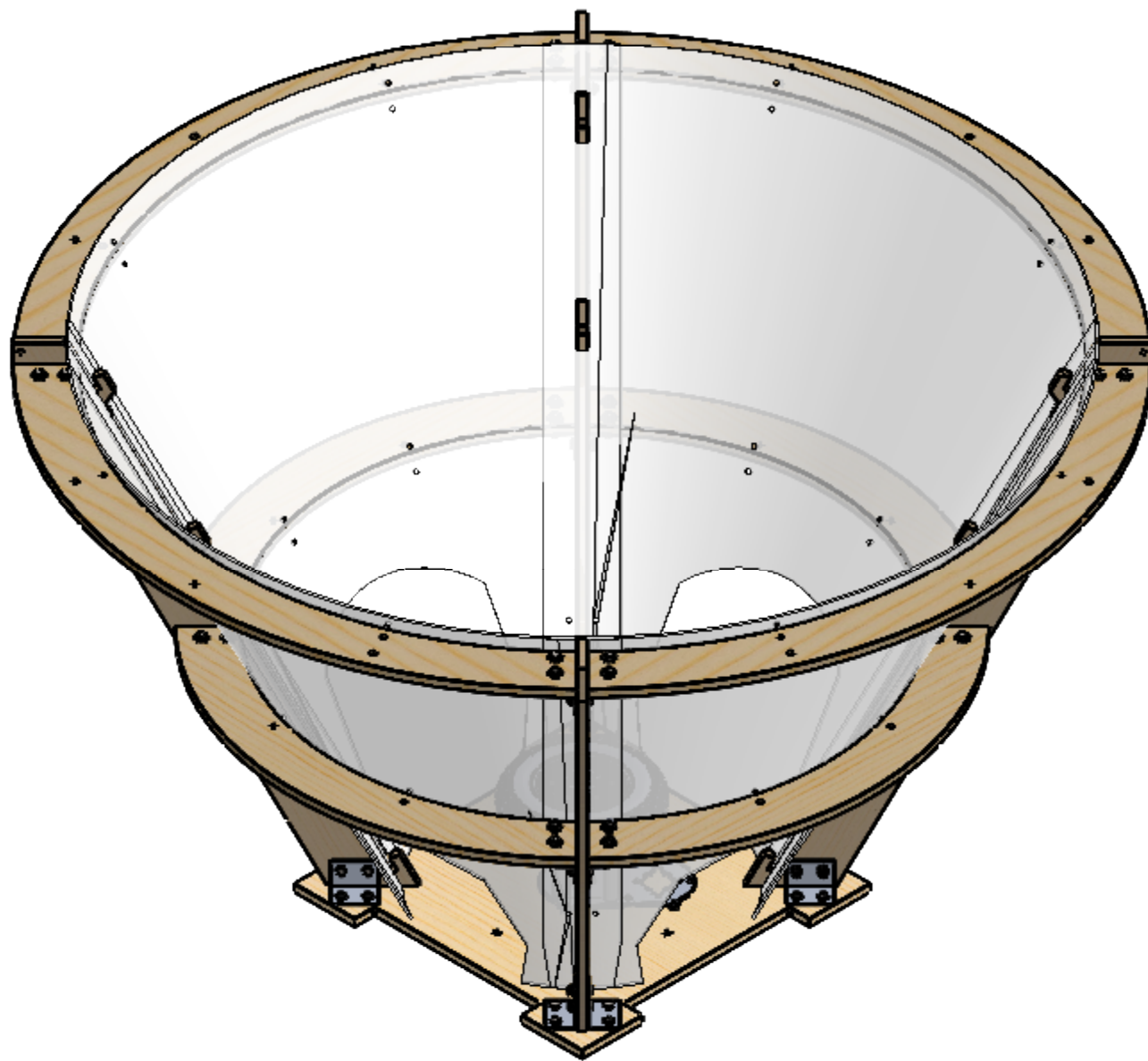
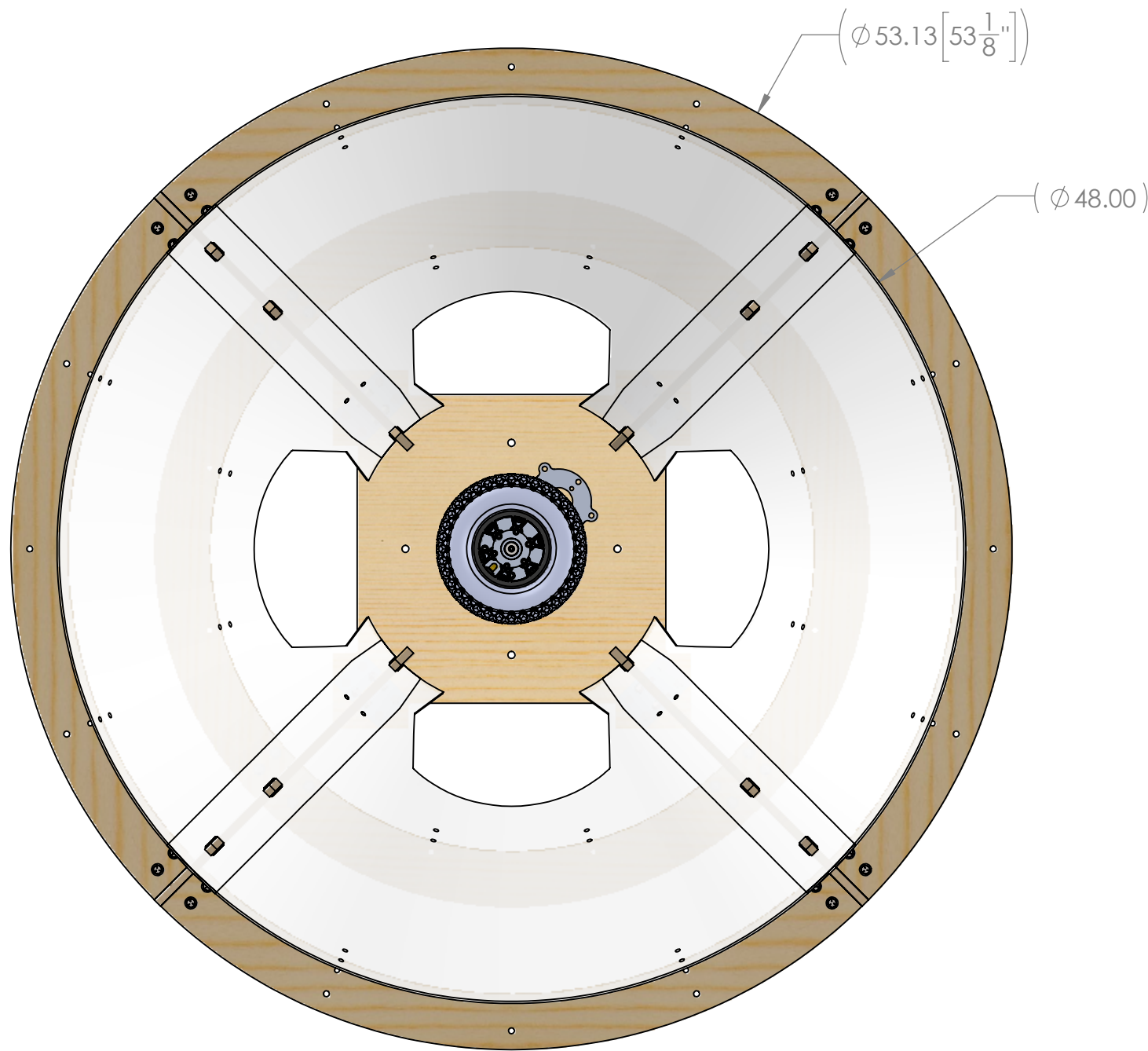
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B

B

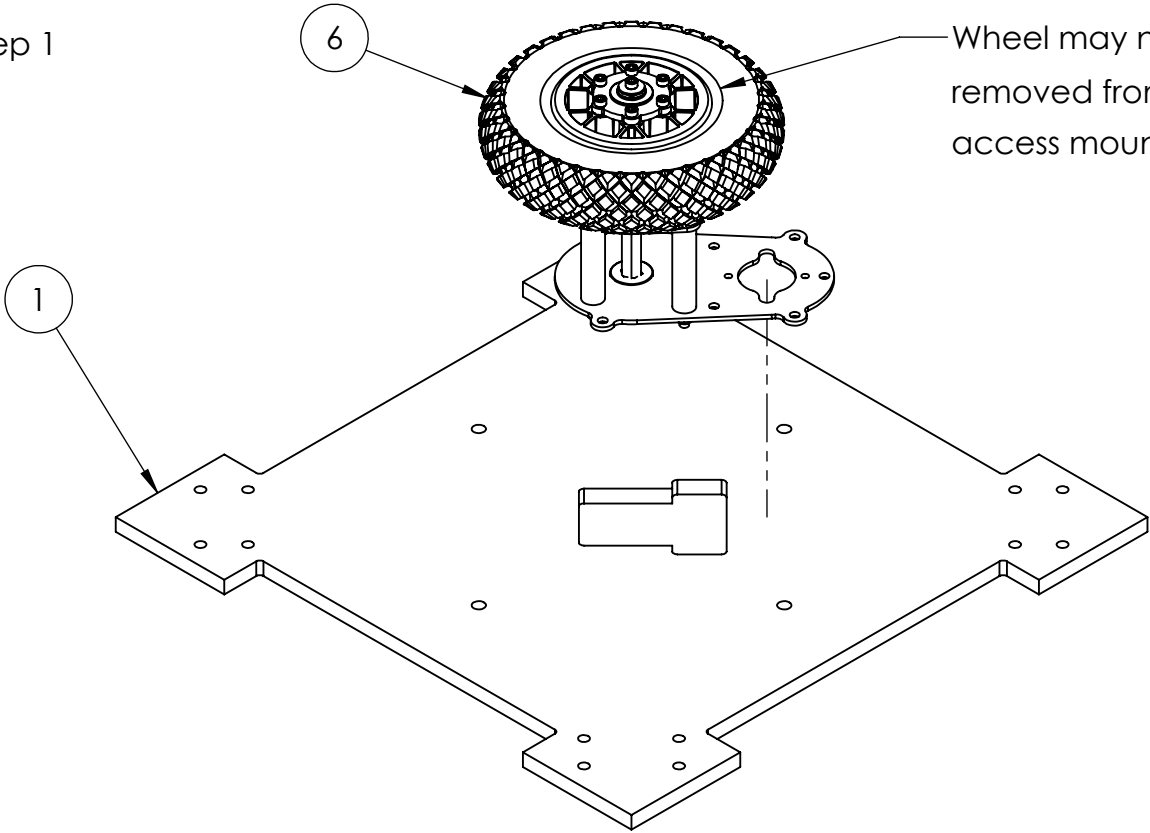
A

A

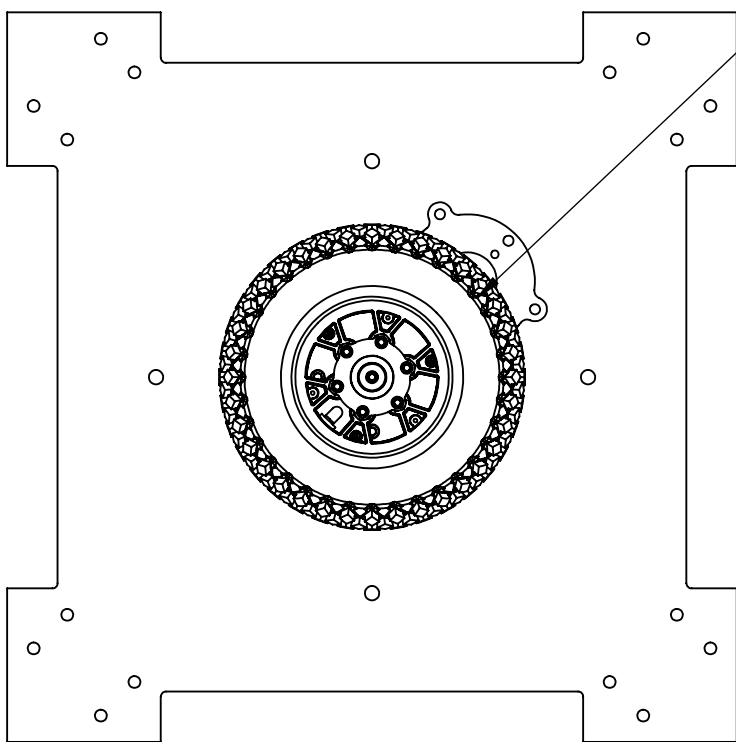


UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	 
	DRAWN	CO	1/3/2022	
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			TITLE: Hub - Complex Build - Upper Hub Assembly AM Agitator AM-4673
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MATERIAL/FINISH:	COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			SIZE DWG. NO. REV
DO NOT SCALE DRAWING				C TE-22190-AMPassive
				SCALE: 1:8 SHEET 2 OF 5

Step 1



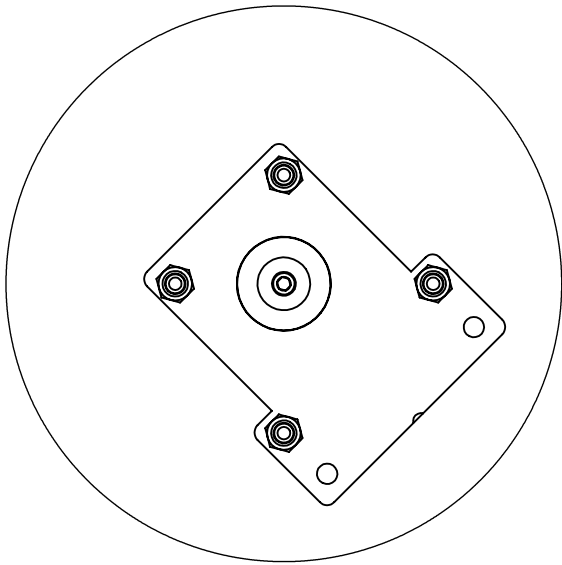
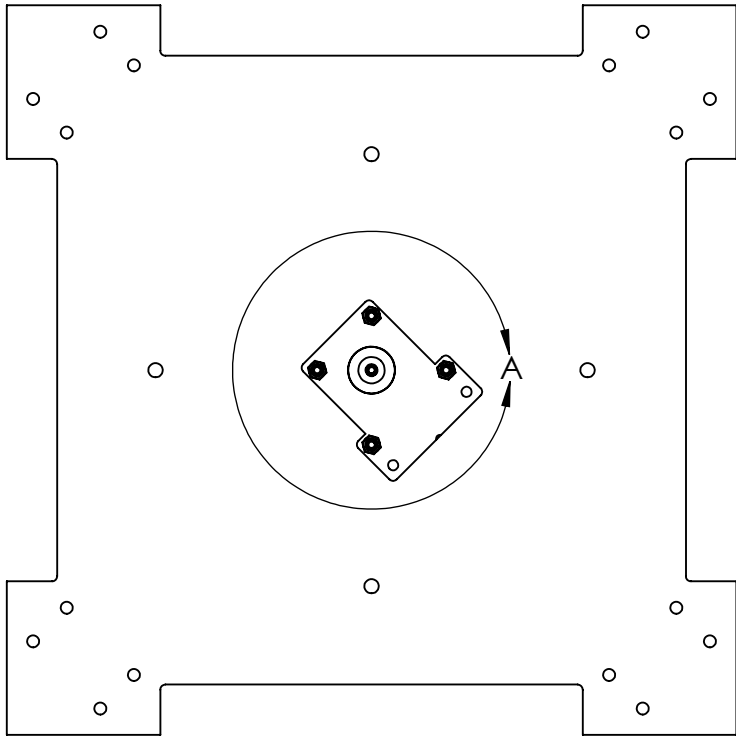
Wheel may need to be temporarily removed from (6) subassembly to access mounting holes.



Wheel should end up centered in assembly.

Top View

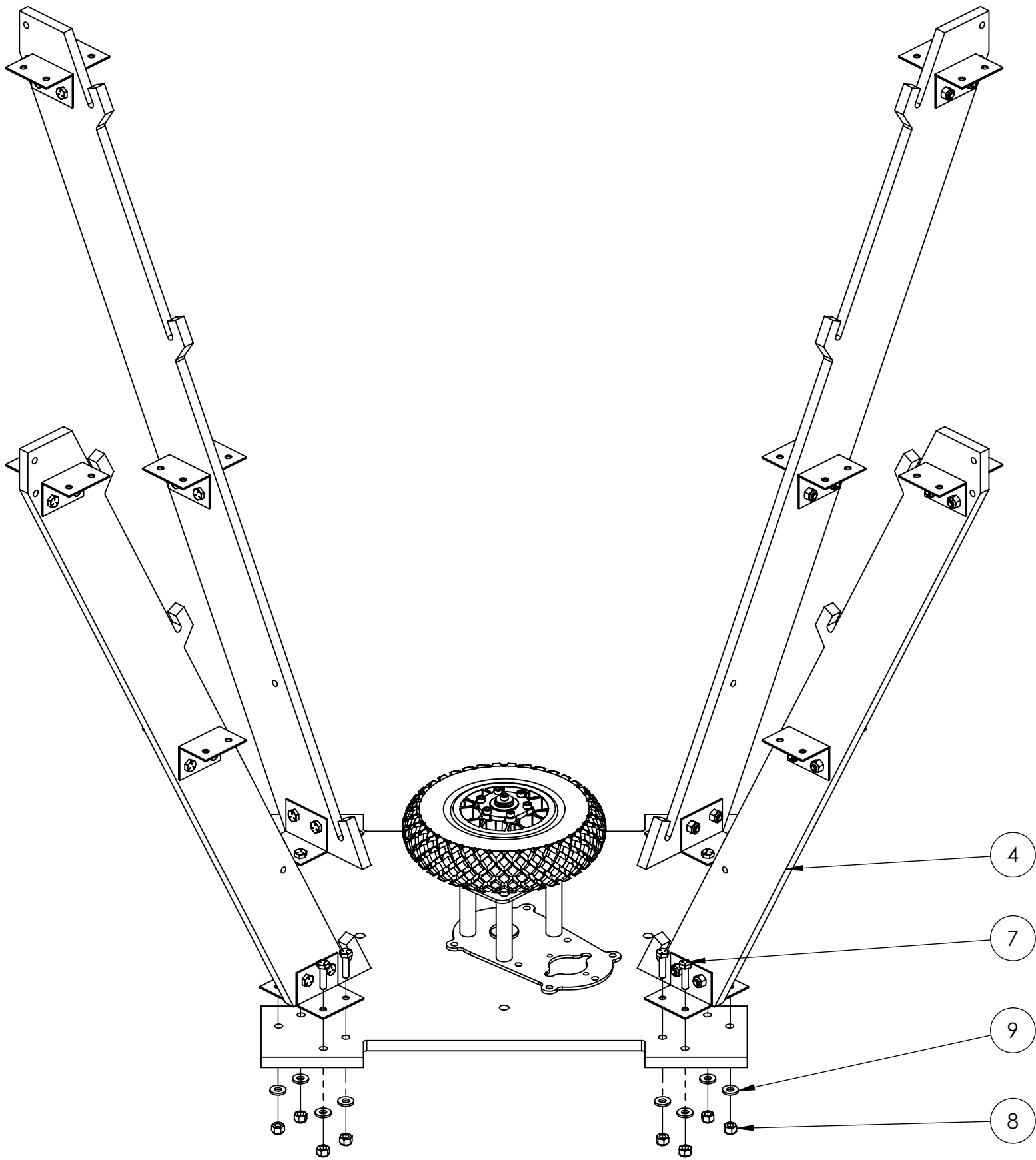
Bottom View





DETAIL A  
SCALE 2 : 5

- Align (6) to (1) as shown. Bolts in (6) should align with cutout in (1), as shown in Detail A .
- Connect using 4x 0.5" long screws paired with and inserted through 4x 1/4" flat washers.  
Alternatively - drill holes in (1) and use 4x bolts with nuts (Nylock recommended) to fasten.

Step 2



- Align 4x (4) to Step 1, as shown.
- Connect using 4x (7) , 4x (9) , and 4x (8) per (4) .

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  MATERIAL/FINISH:         DO NOT SCALE DRAWING	TEAM	NAME	DATE	 	
	DRAWN	CO	1/3/2022		
	PROPRIETARY AND CONFIDENTIAL			TITLE: Hub - Complex Build - Upper Hub Assembly AM Agitator AM-4673	
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.				
COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
			C	TE-22190-AMPassive	
			SCALE: 1:5		SHEET 3 OF 5



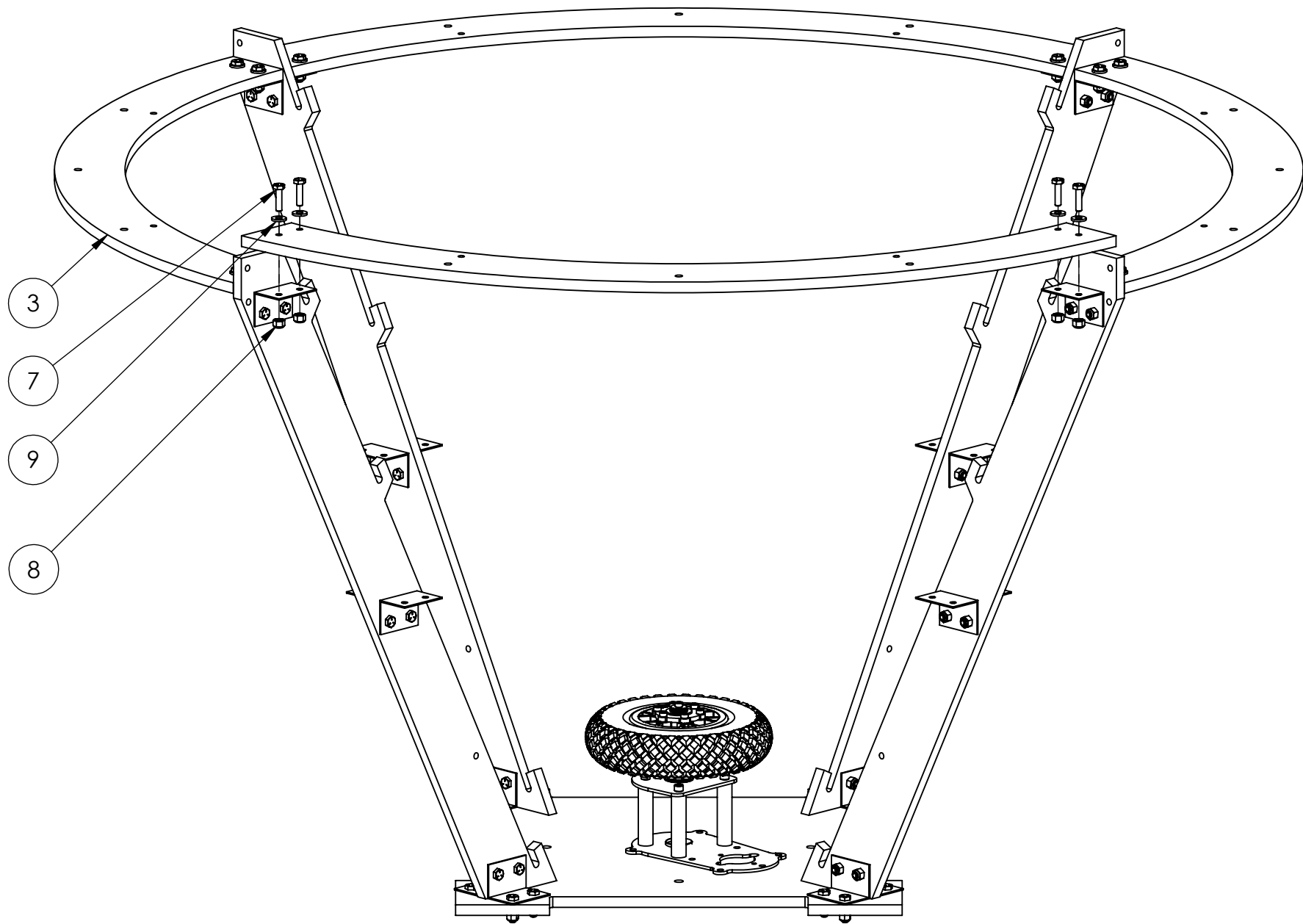
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C

B

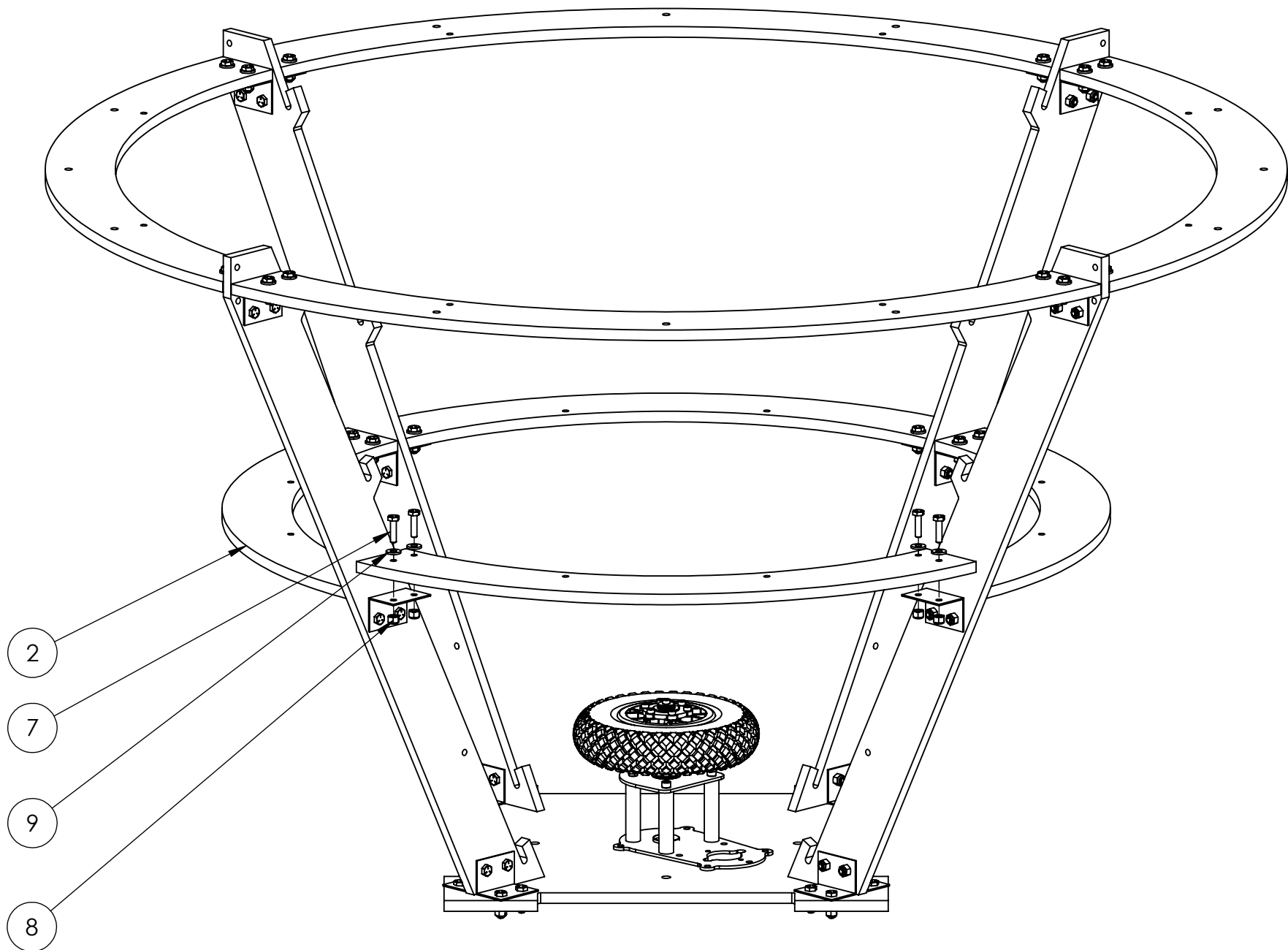
A

Step 3





- 1. Align 4x 3 to Step 2, as shown.
- 2. Connect using 4x 7, 4x 9, and 4x 8 per 3.

Step 4



- 1. Align 4x 2 to Step 3, as shown.
- 2. Connect using 4x 7, 4x 9, and 4x 8 per 2.

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	 
	DRAWN	CO	1/3/2022	
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			TITLE: Hub - Complex Build - Upper Hub Assembly AM Agitator AM-4673
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			
MATERIAL/FINISH:	COMMENTS:			SIZE <b>C</b>
	REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING				TE-22190-AMP active
SCALE: 1:6			SHEET 4 OF 5	

D

C

B

A

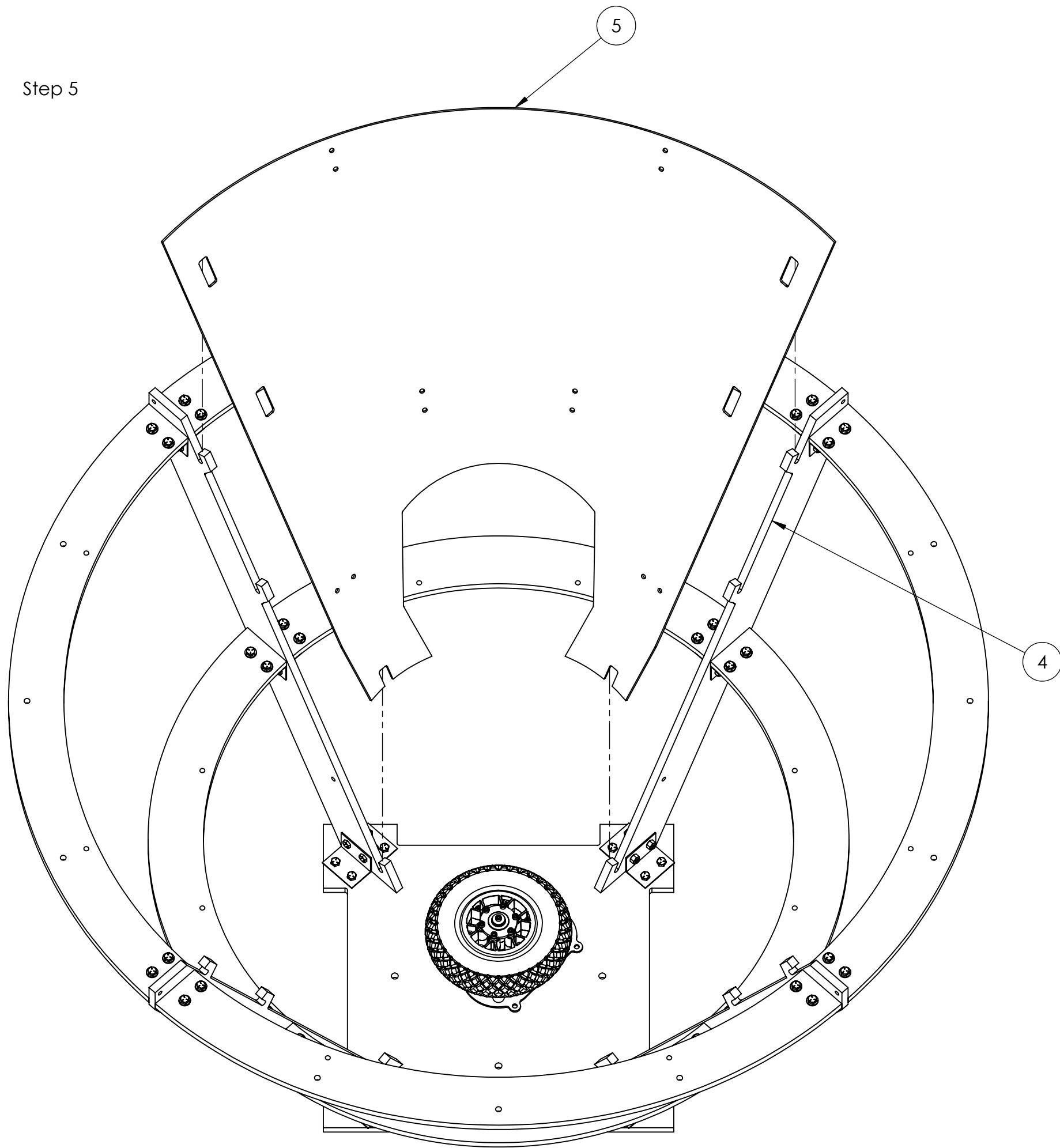
D

C

B

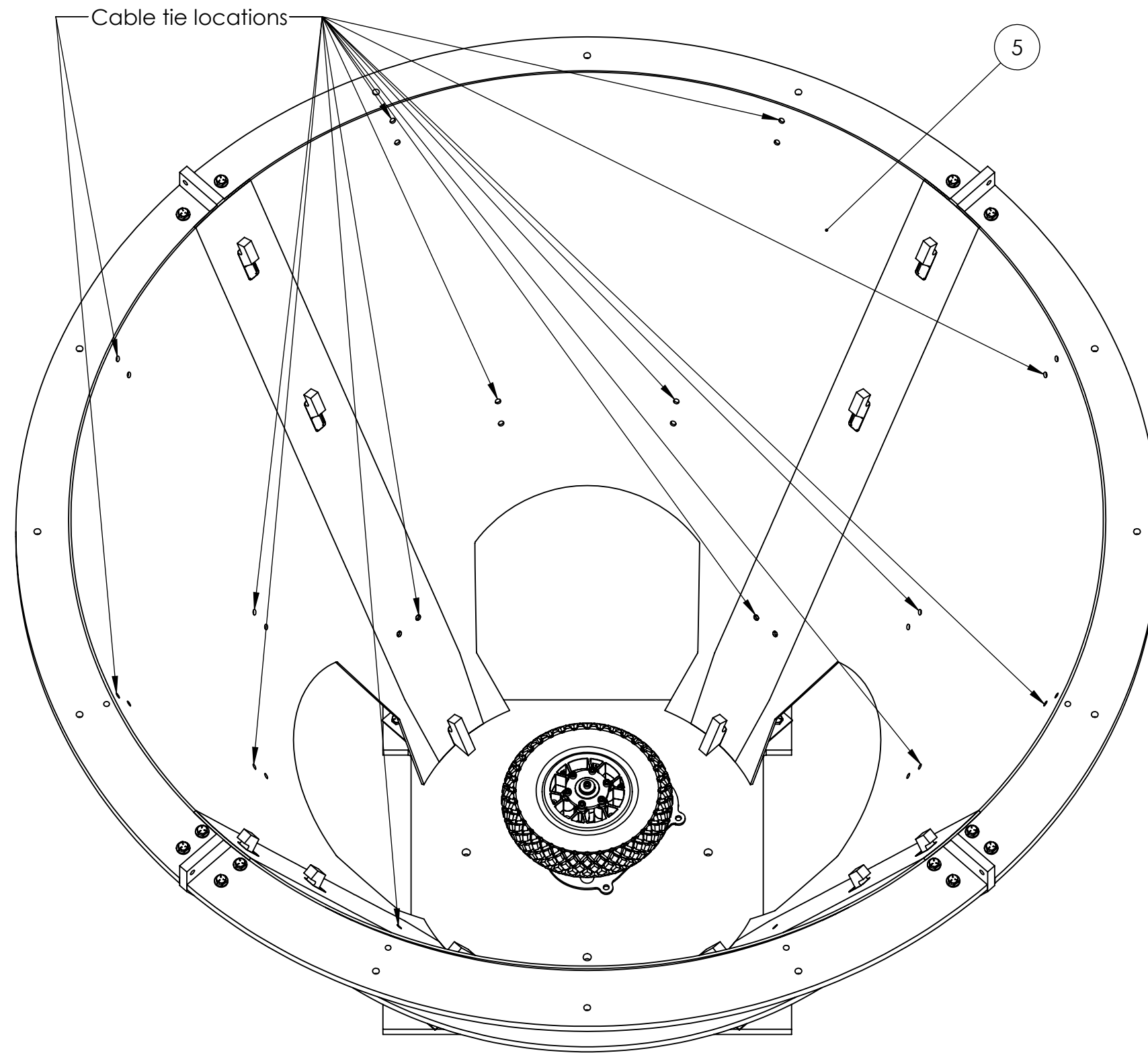
A

Step 5






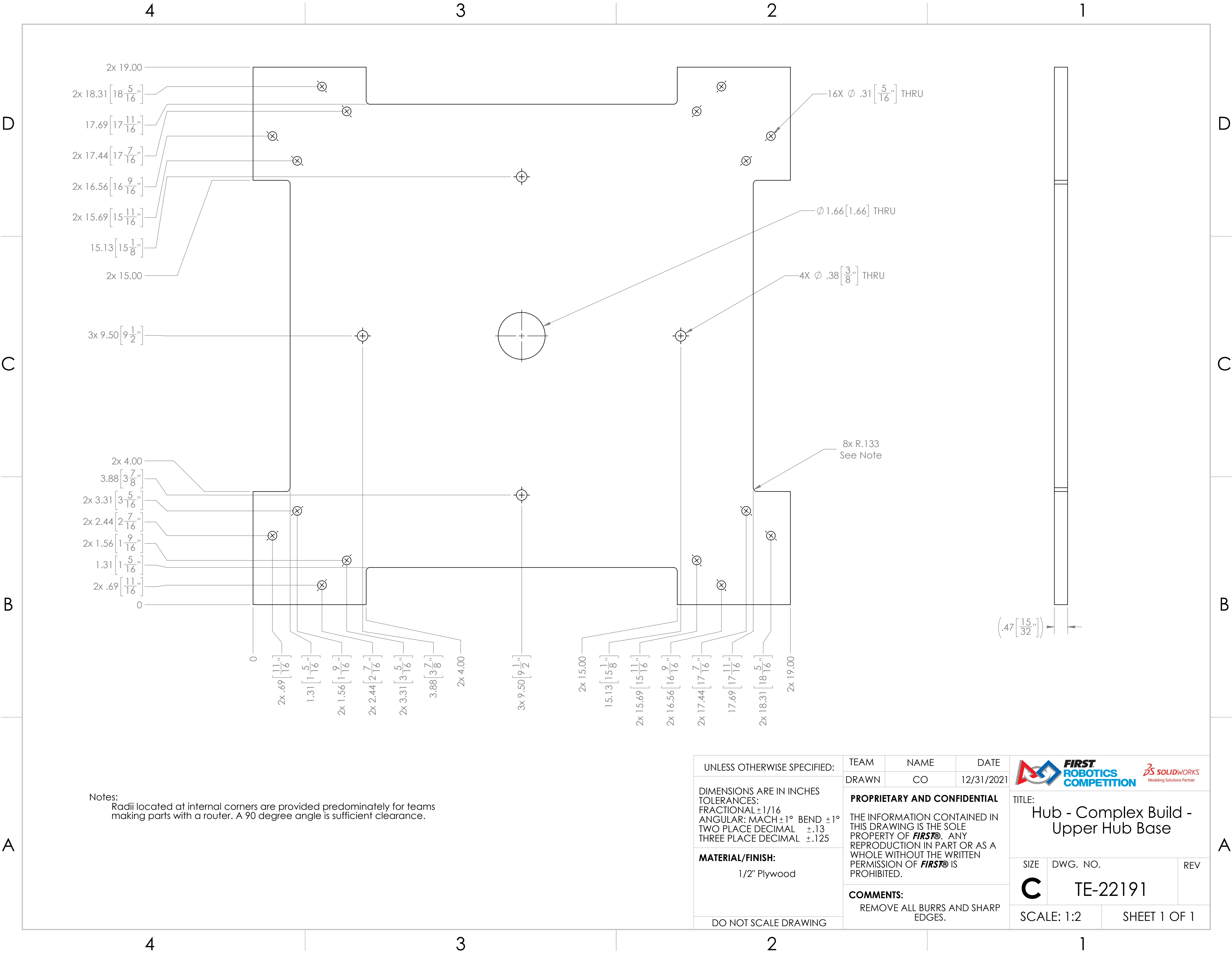
1. Align 1x (5) to Step 3. Do this by bending (5) while lowering into position. The rectangular cutouts (6x) in (5) need to align with hooks on (4) . Note: It will be helpful to have multiple people to help with alignment.
2. Press (5) down firmly to ensure it is fully seated.

Step 6





1. Continue the process described in Step 4 by working around in a circular pattern until there is a total of 4x (5) installed. The orientation of overlaps should not matter (i.e. there is no need to worry about installing in a clockwise or counterclockwise manner). Note: It will be more difficult to seat (5) in overlapped locations - the final piece will be the most difficult.
2. Secure (5) to assembly using 20x 50 lb cable ties, as shown.

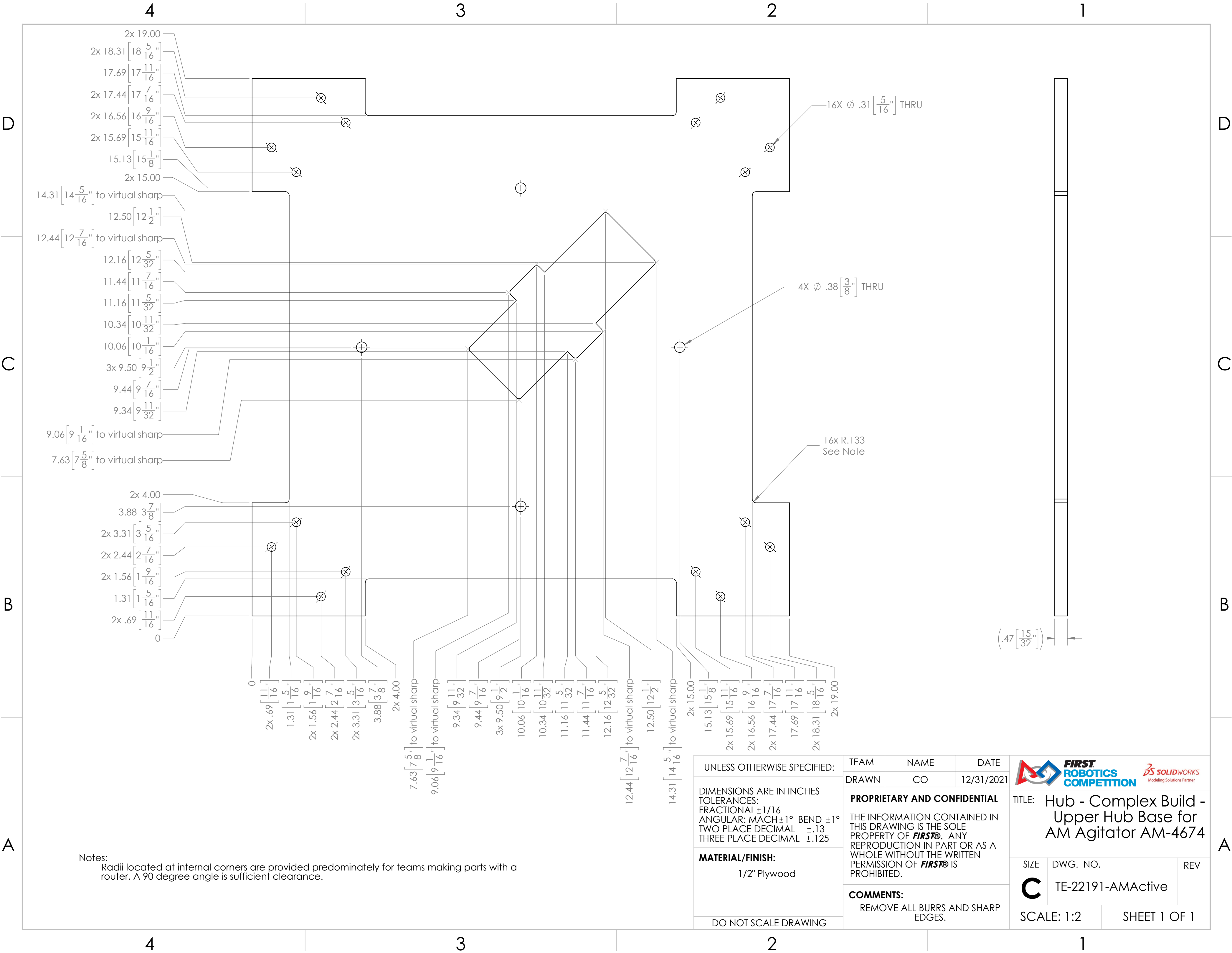
UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  MATERIAL/FINISH:   DO NOT SCALE DRAWING	TEAM	NAME	DATE	  
	DRAWN	CO	1/3/2022	
	PROPRIETARY AND CONFIDENTIAL  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  COMMENTS: REMOVE ALL BURRS AND SHARP EDGES.			
TITLE: Hub - Complex Build - Upper Hub Assembly AM Agitator AM-4673				
SIZE		DWG. NO.		REV
C		TE-22190-AMPassive		
SCALE: 1:6			SHEET 5 OF 5	





Notes:  
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

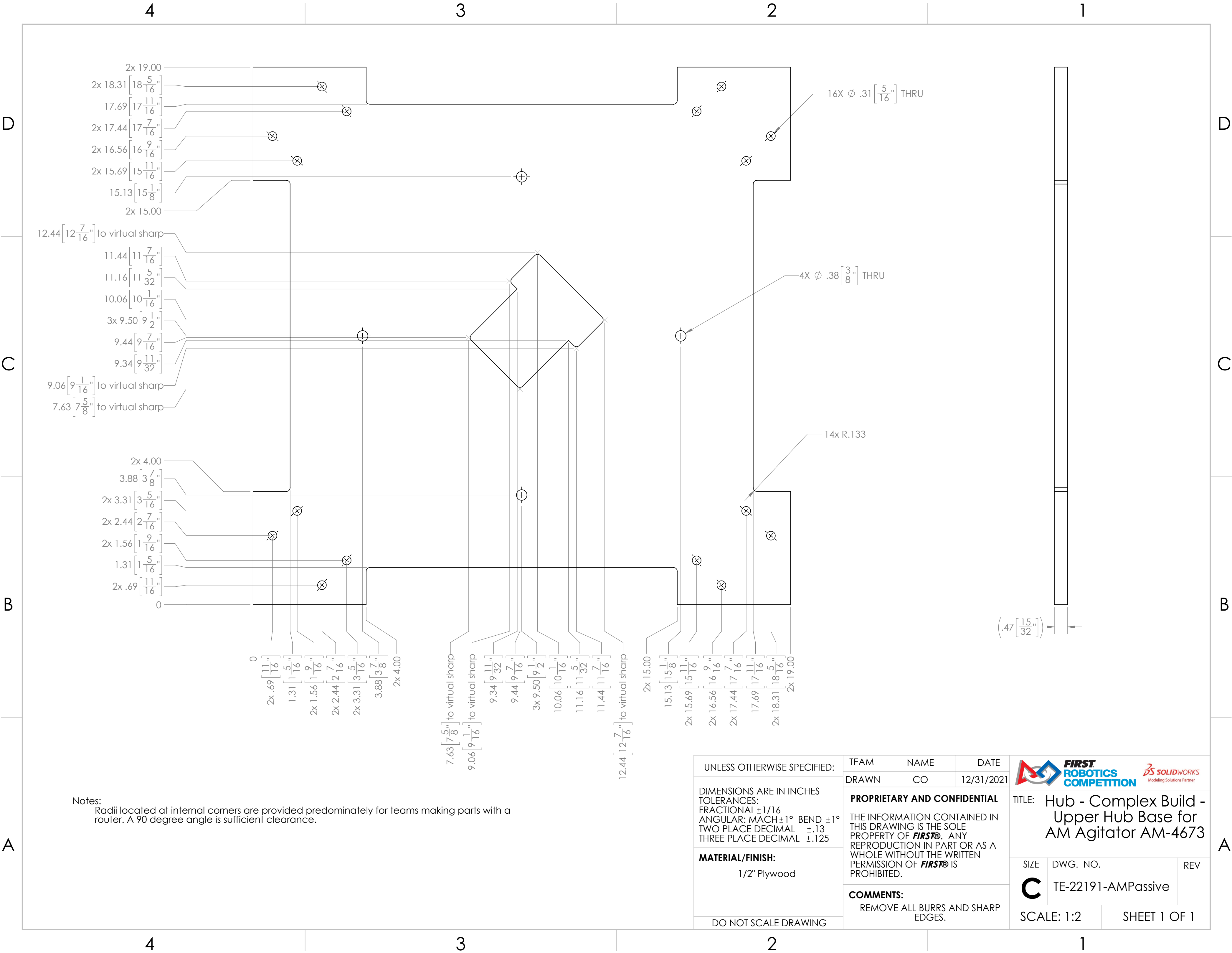
UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	 		
	DRAWN	CO	12/31/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE:  Hub - Complex Build - Upper Hub Base		
	<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
				C	TE-22191	
<b>MATERIAL/FINISH:</b>  1/2" Plywood				SCALE: 1:2		SHEET 1 OF 1
DO NOT SCALE DRAWING						







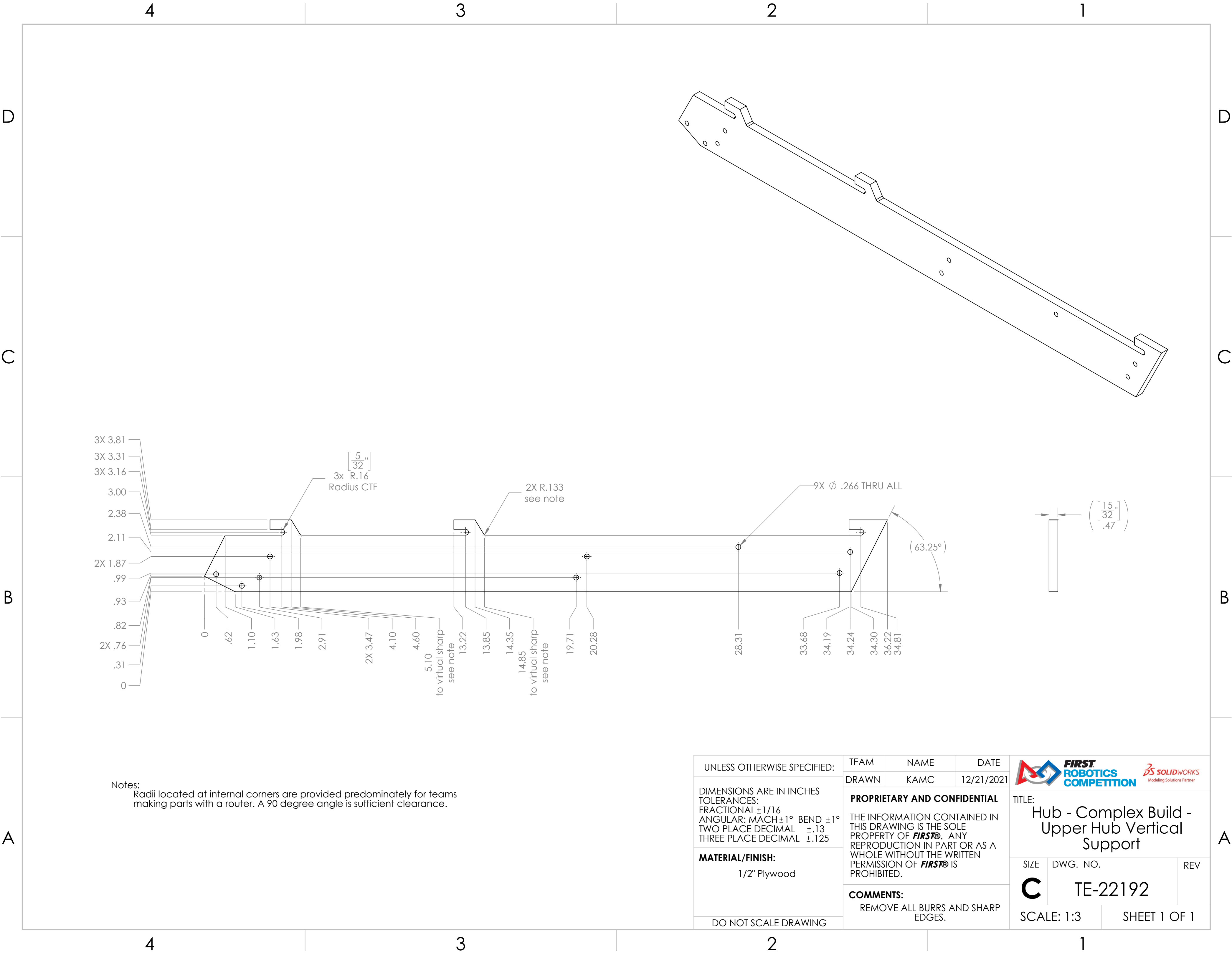
Notes:  
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div> <div>TITLE: Hub - Complex Build - Upper Hub Base for AM Agitator AM-4674</div>	
	DRAWN	CO	12/31/2021		
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			SIZE DWG. NO. REV C TE-22191-AMActive	
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.				
MATERIAL/FINISH:  1/2" Plywood	COMMENTS:			SCALE: 1:2 SHEET 1 OF 1	
	REMOVE ALL BURRS AND SHARP EDGES.				
DO NOT SCALE DRAWING					





Notes:  
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

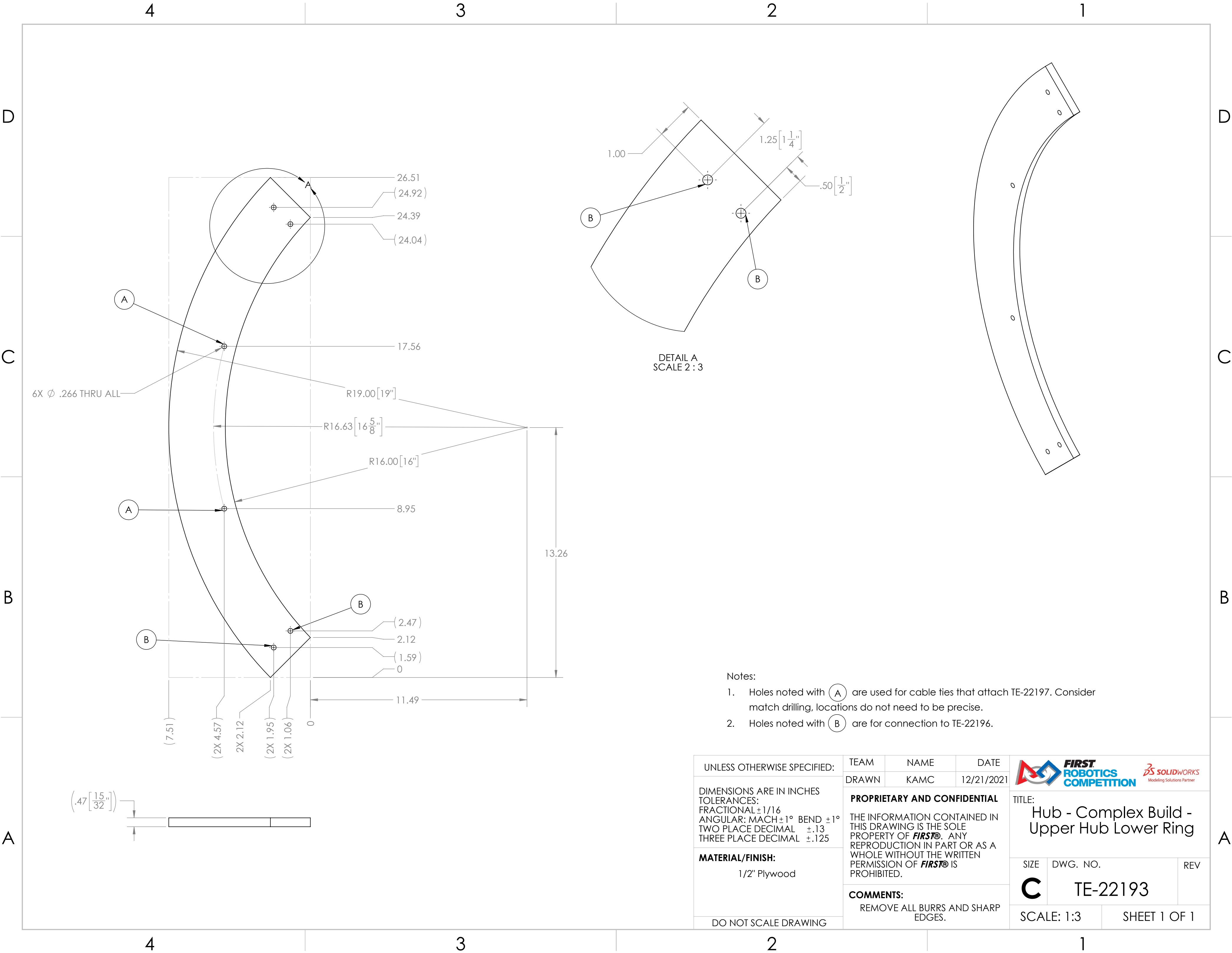
UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div><div>FIRST ROBOTICS COMPETITION</div></div>		
	DRAWN	CO	12/31/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	PROPRIETARY AND CONFIDENTIAL			TITLE: Hub - Complex Build - Upper Hub Base for AM Agitator AM-4673		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.					
MATERIAL/FINISH:  1/2" Plywood	COMMENTS:			SIZE	DWG. NO.	REV
	REMOVE ALL BURRS AND SHARP EDGES.			C	TE-22191-AMPassive	
DO NOT SCALE DRAWING				SCALE: 1:2		SHEET 1 OF 1

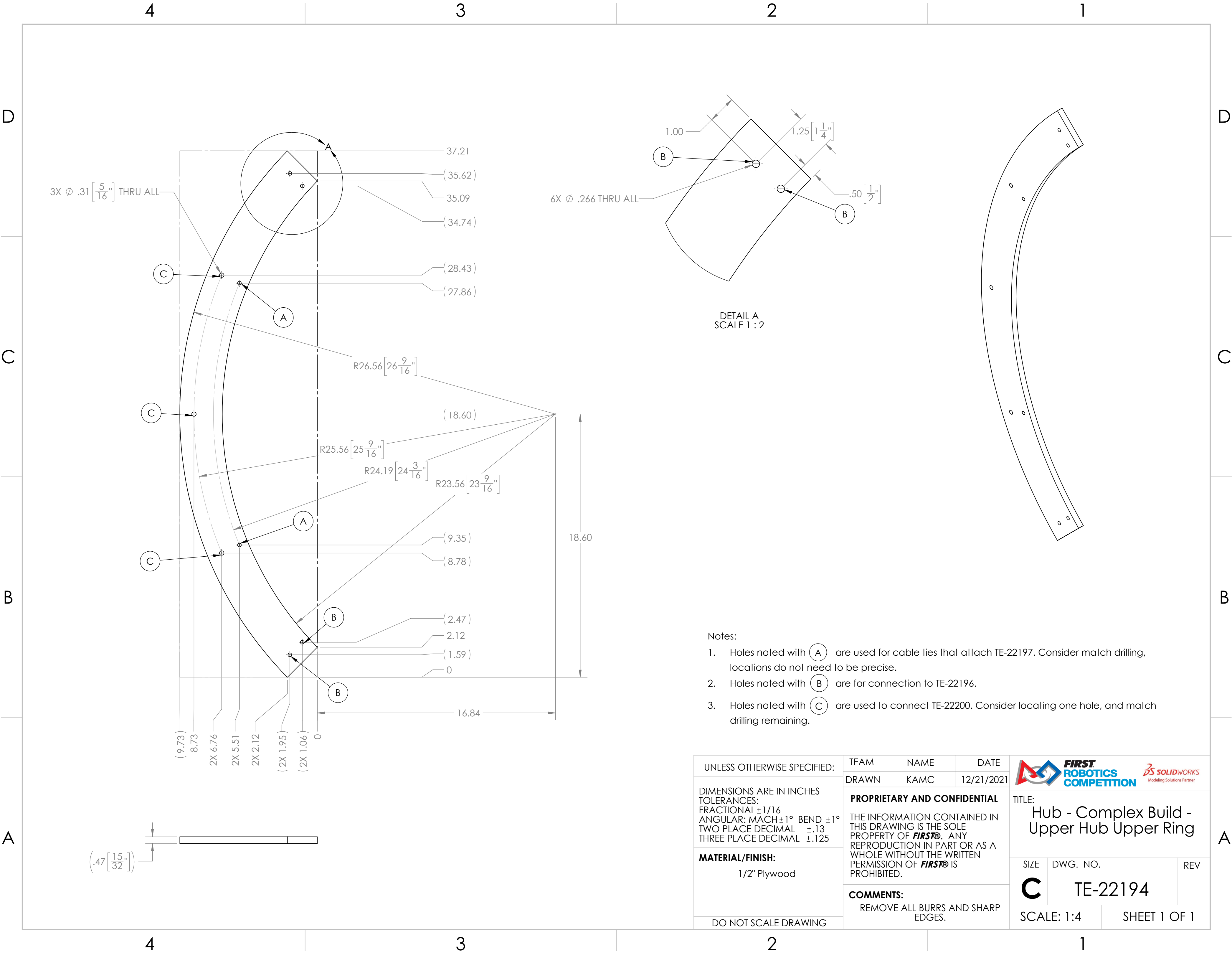


Notes:  
Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  1/2" Plywood  DO NOT SCALE DRAWING	TEAM	NAME	DATE	 		
	DRAWN	KAMC	12/21/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE:  Hub - Complex Build - Upper Hub Vertical Support		
	<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
				C	TE-22192	
				SCALE: 1:3		SHEET 1 OF 1





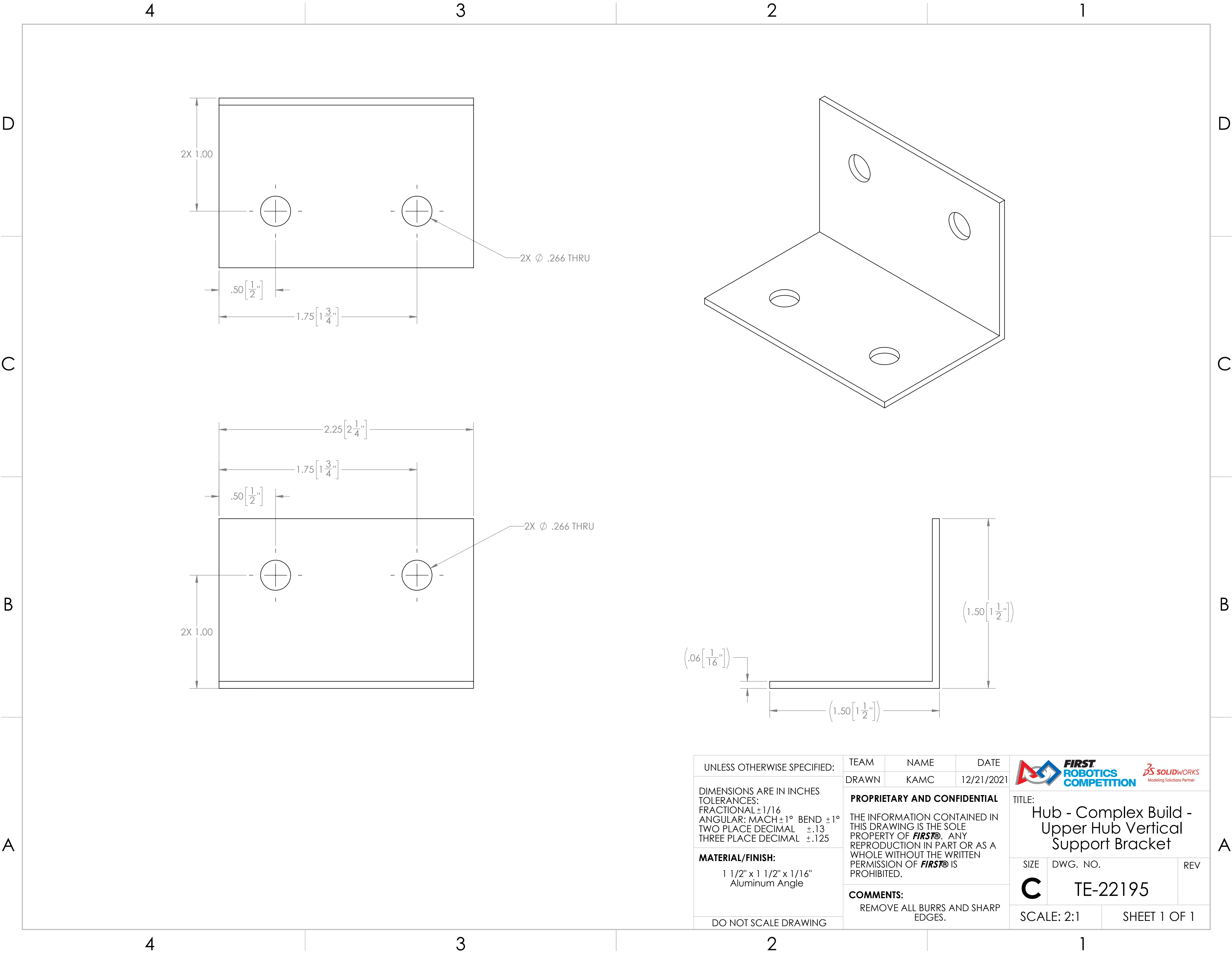






Notes:

- Holes noted with (A) are used for cable ties that attach TE-22197. Consider match drilling, locations do not need to be precise.
- Holes noted with (B) are for connection to TE-22196.
- Holes noted with (C) are used to connect TE-22200. Consider locating one hole, and match drilling remaining.

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div><div></div><div>TITLE: Hub - Complex Build - Upper Hub Upper Ring</div></div>
	DRAWN	KAMC	12/21/2021	
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			
MATERIAL/FINISH:  1/2" Plywood	COMMENTS:			
	REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING	SCALE: 1:4		SHEET 1 OF 1	



UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/21/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	PROPRIETARY AND CONFIDENTIAL			TITLE:		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			Hub - Complex Build - Upper Hub Vertical Support Bracket		
MATERIAL/FINISH:  1 1/2" x 1 1/2" x 1/16" Aluminum Angle	COMMENTS:  REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
				C	TE-22195	
DO NOT SCALE DRAWING				SCALE: 2:1		SHEET 1 OF 1



4

3

2

1

D

D

C

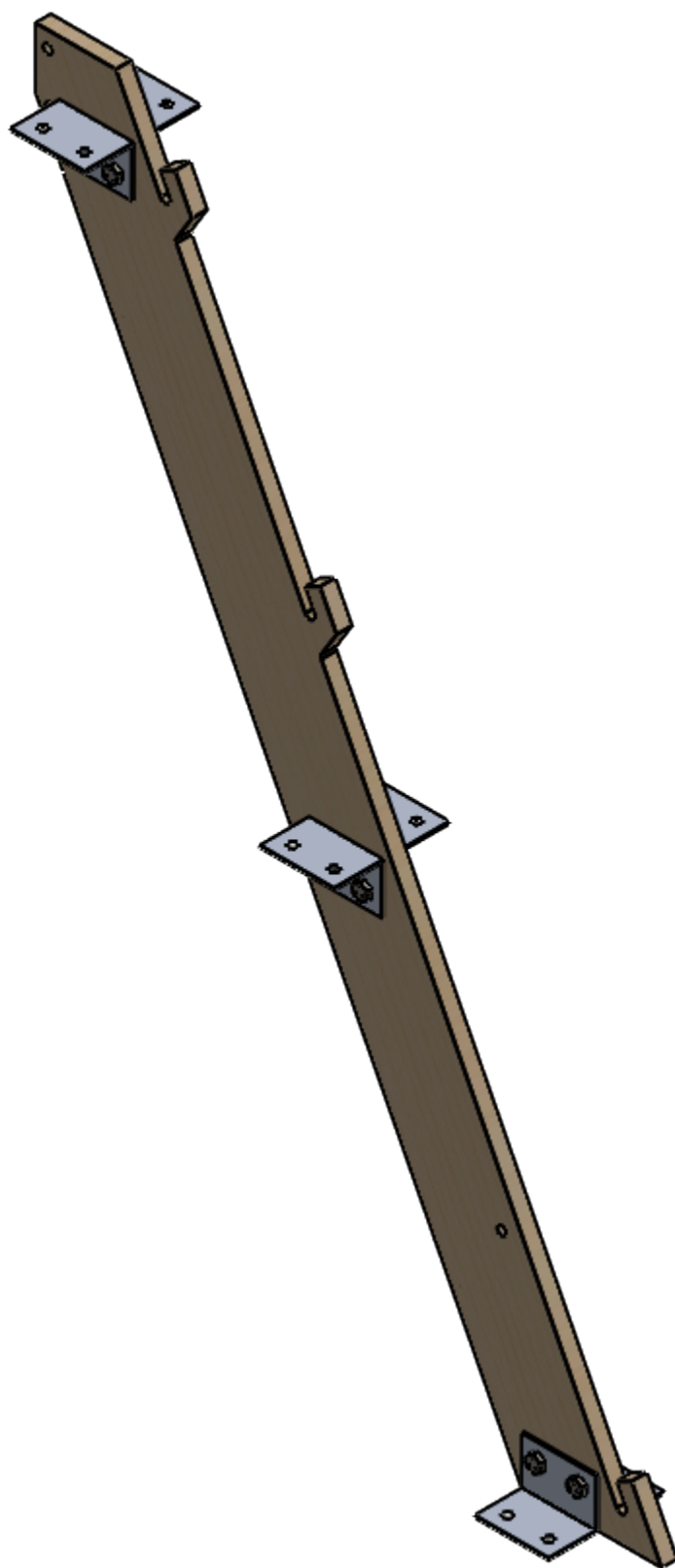
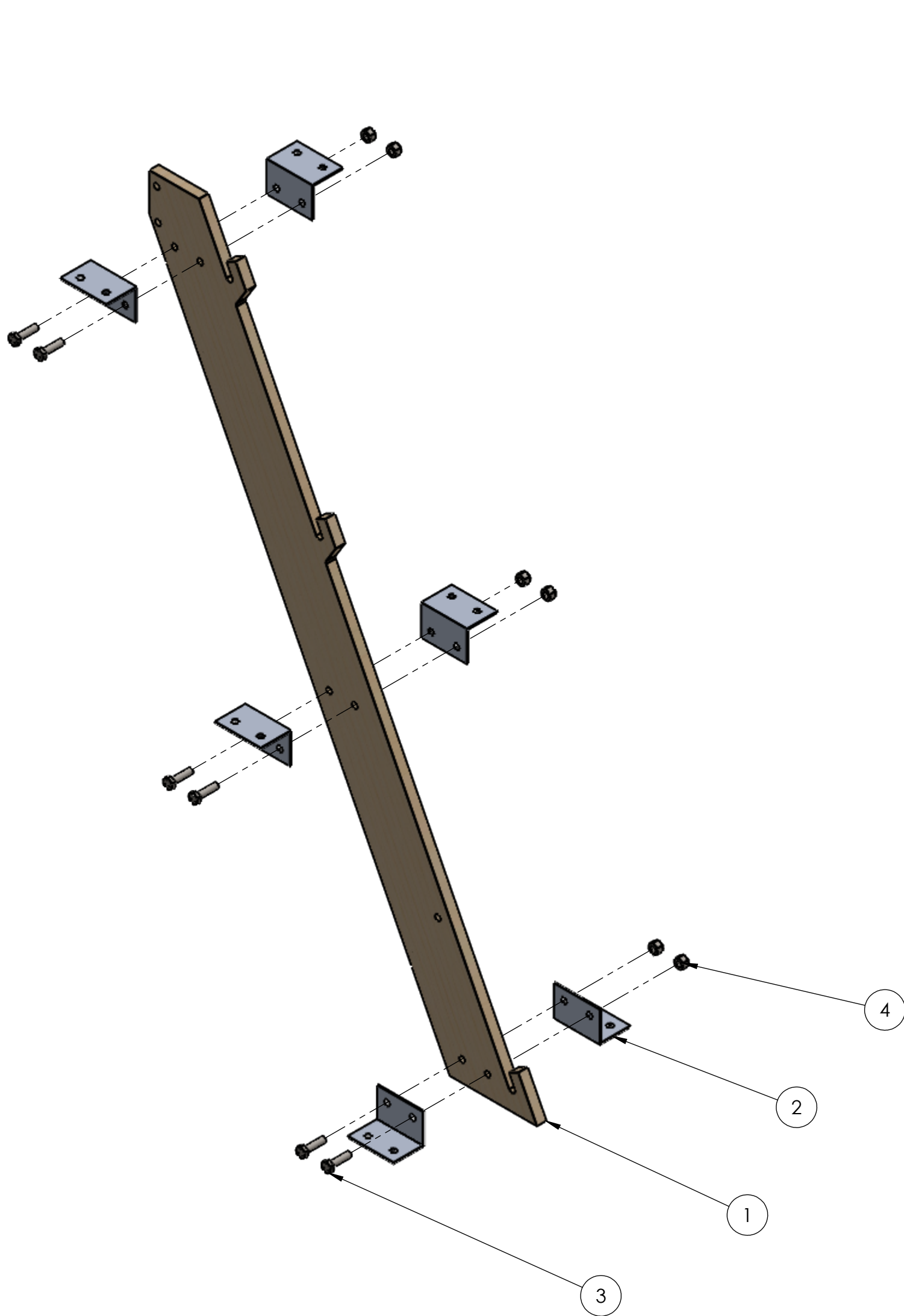
C

B

B



A

A



- Step 1:
1. Attach 6x (2) to (1) using 6x (3) and 6x (4) . as shown. Note orientation of (2) .

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22192	Hub - Complex Build - Upper Hub Vertical Support	1
2	TE-22195	Hub - Complex Build - Upper Hub Vertical Support Bracket	6
3	hex_.25_20_1	Steel Hex Head Screw, 1/4"-20 x 3/4" long, fully threaded	6
4	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	6

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	<div><div>FIRST ROBOTICS COMPETITION</div></div>		
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125		DRAWN	KAMC	12/22/2021			
MATERIAL/FINISH:		PROPRIETARY AND CONFIDENTIAL			TITLE: Hub - Complex Build - Upper Hub Vertical Support and Bracket Assembly		
		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.					
DO NOT SCALE DRAWING		COMMENTS:			SIZE	DWG. NO.	REV
		REMOVE ALL BURRS AND SHARP EDGES.			C	TE-22196	
					SCALE: 1:4		SHEET 1 OF 2

D

C

B

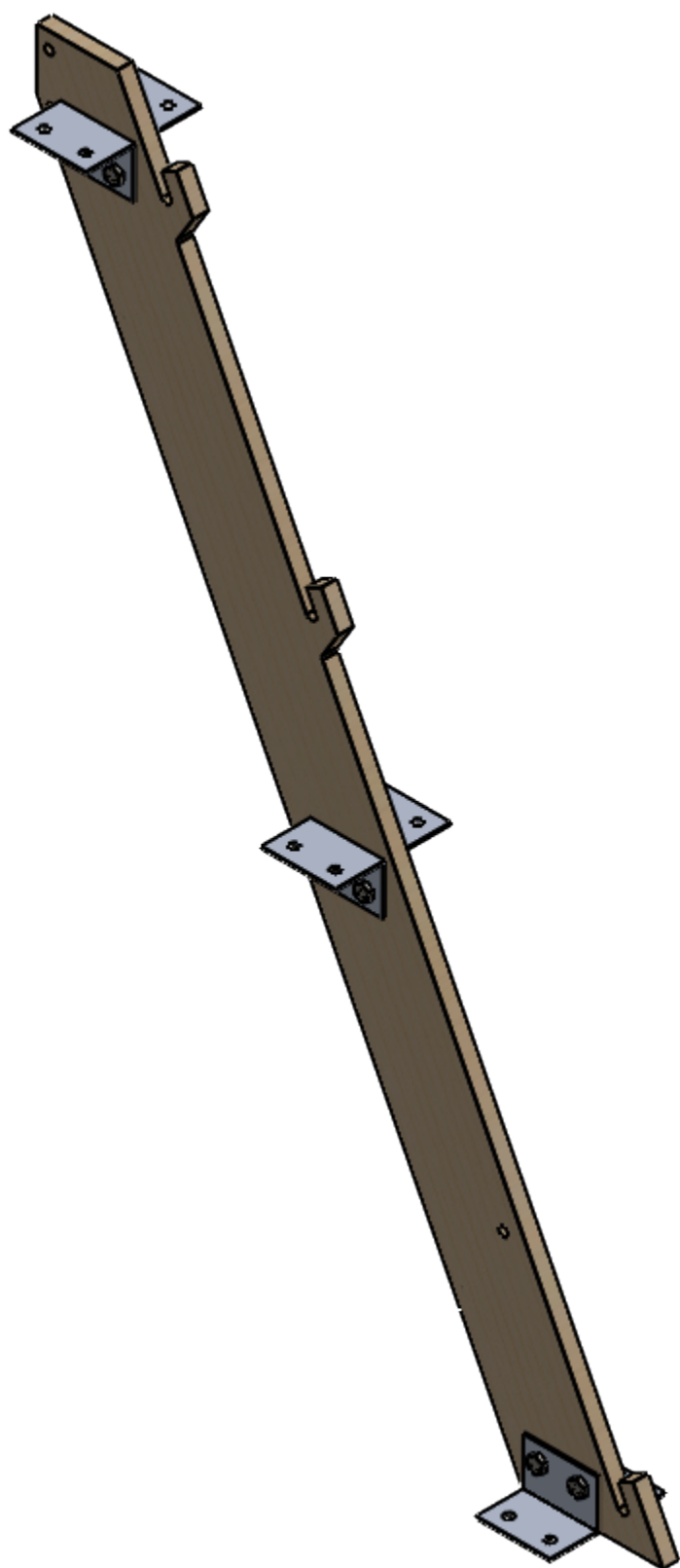
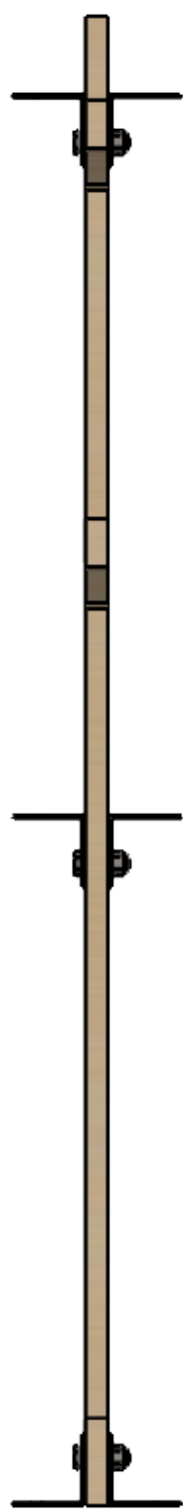
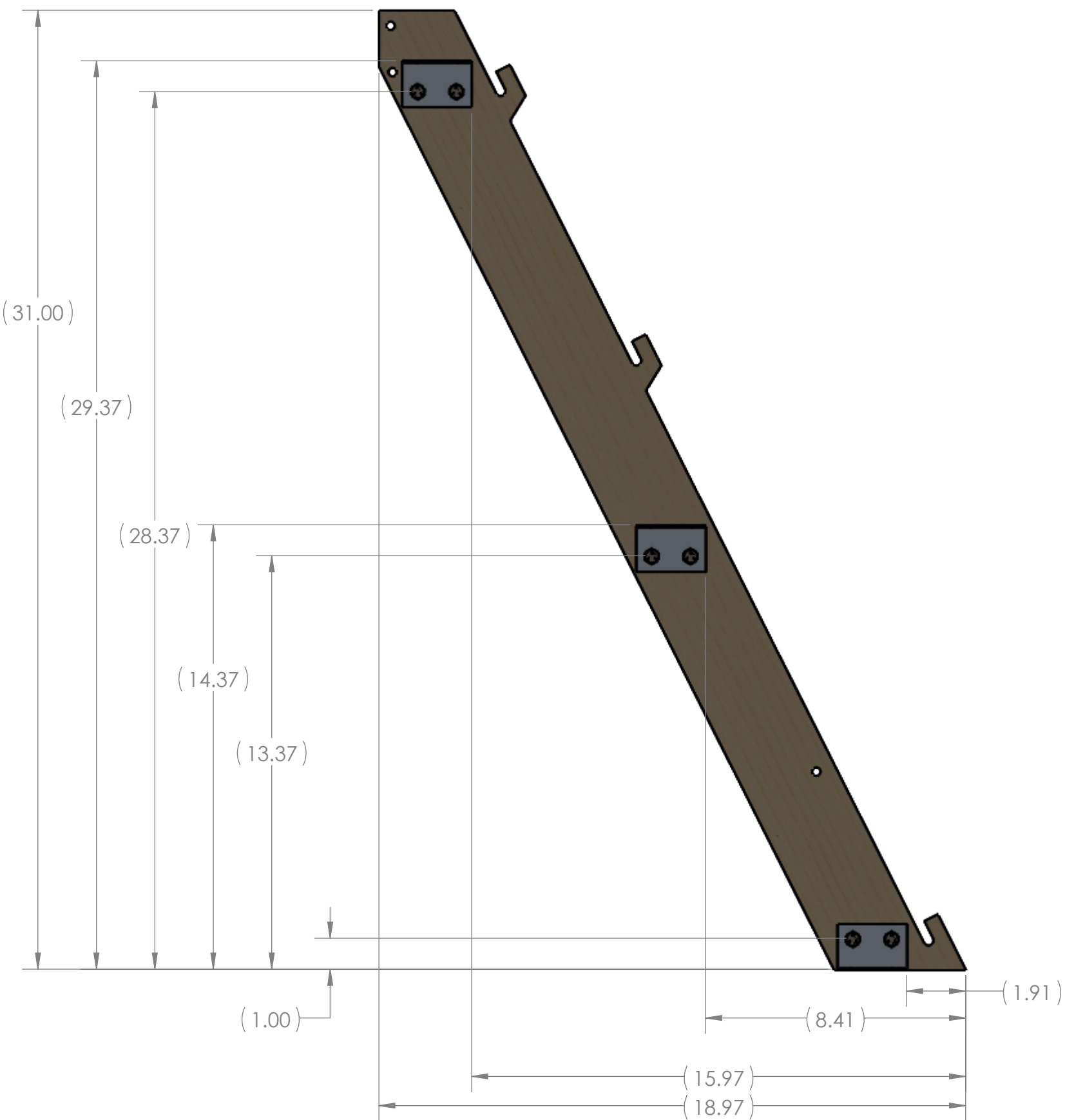
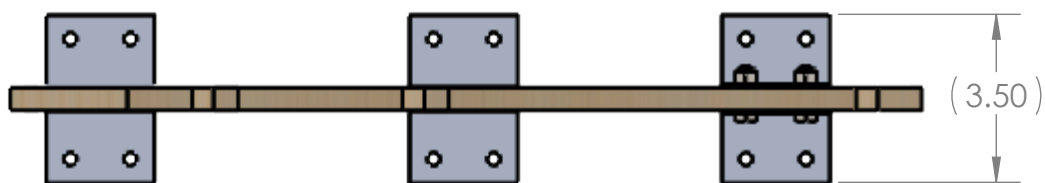
A

D

C

B

A



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .13$   
THREE PLACE DECIMAL  $\pm .125$

**MATERIAL/FINISH:**

DO NOT SCALE DRAWING

TEAM

DRAWN

**PROPRIETARY AND CONFIDENTIAL**

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF **FIRST®**. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF **FIRST®** IS PROHIBITED.

**COMMENTS:**

REMOVE ALL BURRS AND SHARP EDGES.

NAME

KAMC

DATE

12/22/2021



**FIRST**  
ROBOTICS  
COMPETITION



Modeling Solutions Partner

TITLE: Hub - Complex Build -  
Upper Hub Vertical  
Support and Bracket  
Assembly

SIZE

**C**

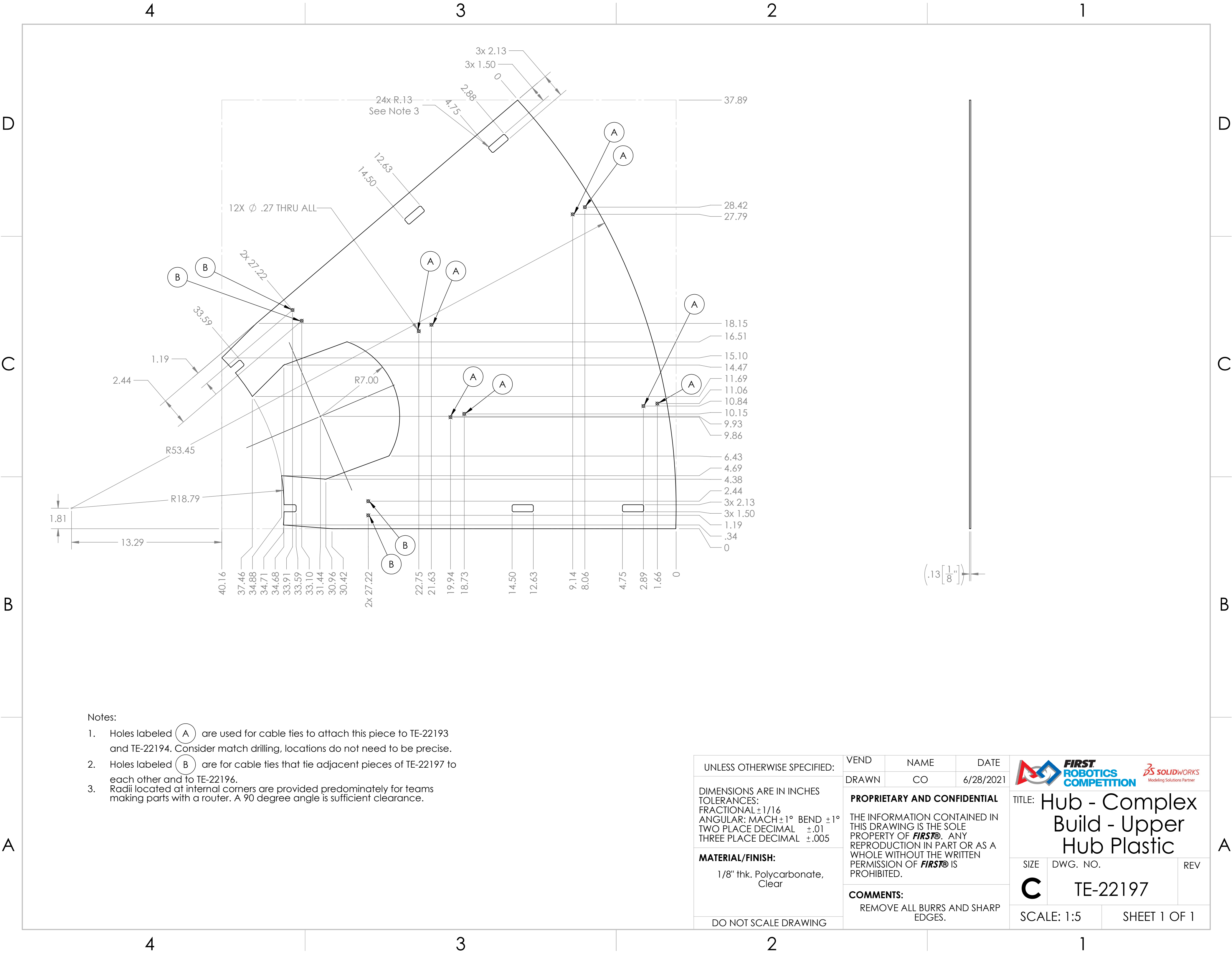
DWG. NO.

TE-22196

REV

SCALE: 1:4

SHEET 2 OF 2



Notes:

- Holes labeled (A) are used for cable ties to attach this piece to TE-22193 and TE-22194. Consider match drilling, locations do not need to be precise.
- Holes labeled (B) are for cable ties that tie adjacent pieces of TE-22197 to each other and to TE-22196.
- Radii located at internal corners are provided predominately for teams making parts with a router. A 90 degree angle is sufficient clearance.

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL  $\pm 1/16$   
ANGULAR: MACH  $\pm 1^\circ$  BEND  $\pm 1^\circ$   
TWO PLACE DECIMAL  $\pm .01$   
THREE PLACE DECIMAL  $\pm .005$

MATERIAL/FINISH:

1/8" thk. Polycarbonate,  
Clear

DO NOT SCALE DRAWING

VEND	NAME	DATE
DRAWN	CO	6/28/2021

PROPRIETARY AND CONFIDENTIAL

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF **FIRST**. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF **FIRST** IS PROHIBITED.

COMMENTS:

REMOVE ALL BURRS AND SHARP EDGES.

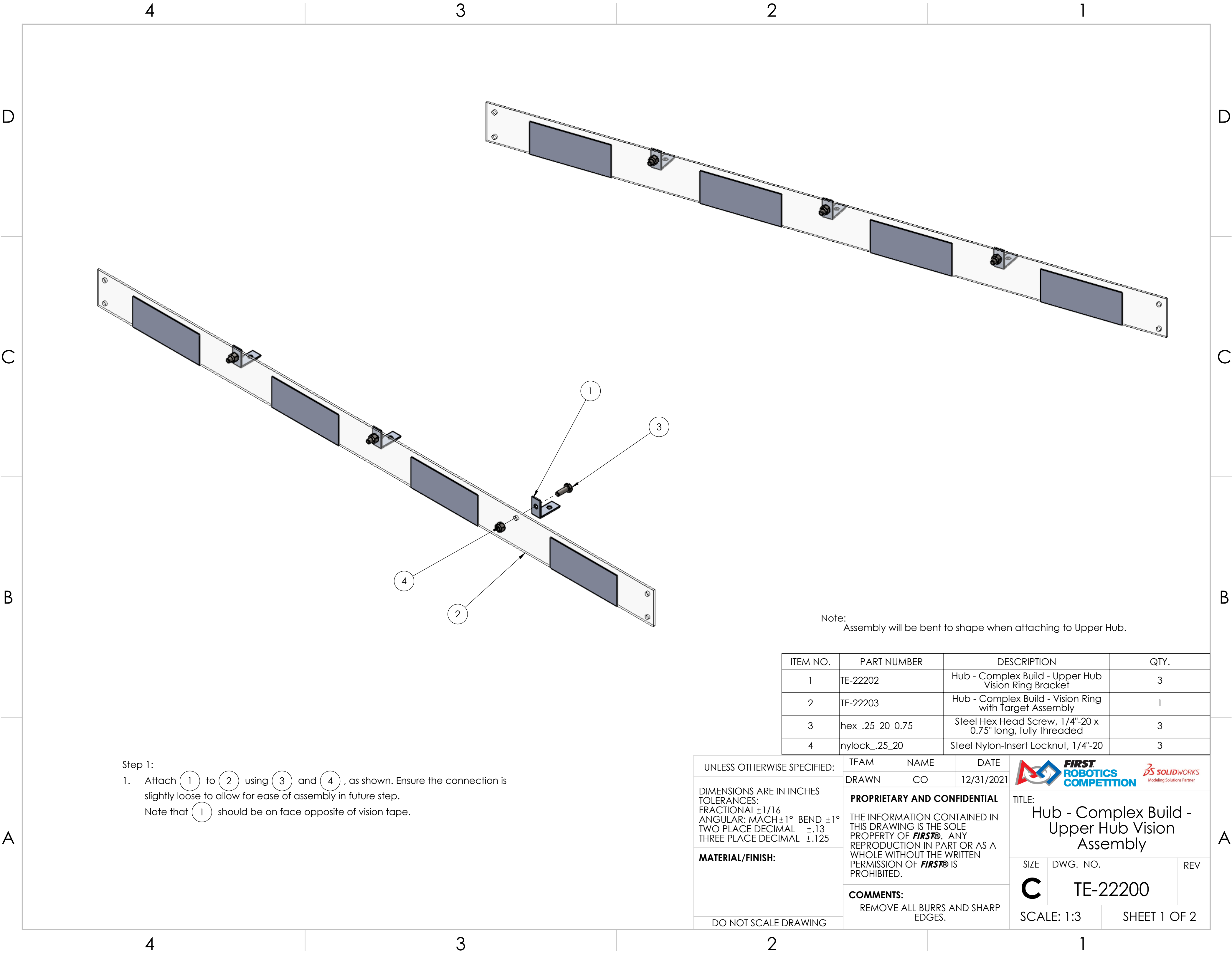


TITLE: Hub - Complex Build - Upper Hub Plastic

SIZE	DWG. NO.	REV
C	TE-22197	

SCALE: 1:5 SHEET 1 OF 1







Step 1:

1. Attach (1) to (2) using (3) and (4), as shown. Ensure the connection is slightly loose to allow for ease of assembly in future step.  
Note that (1) should be on face opposite of vision tape.

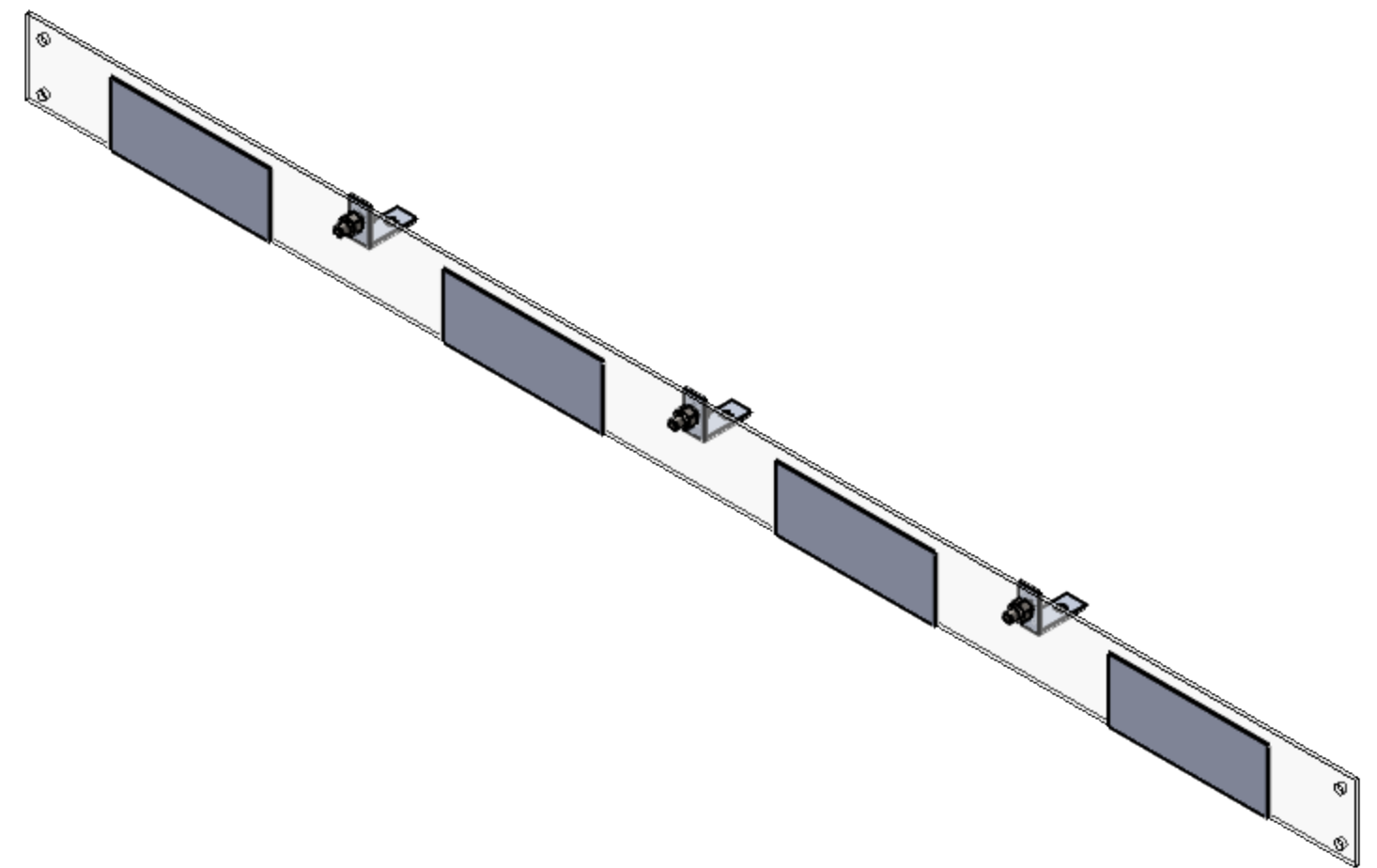
Note:  
Assembly will be bent to shape when attaching to Upper Hub.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22202	Hub - Complex Build - Upper Hub Vision Ring Bracket	3
2	TE-22203	Hub - Complex Build - Vision Ring with Target Assembly	1
3	hex_.25_20_0.75	Steel Hex Head Screw, 1/4"-20 x 0.75" long, fully threaded	3
4	nylock_.25_20	Steel Nylon-Insert Locknut, 1/4"-20	3

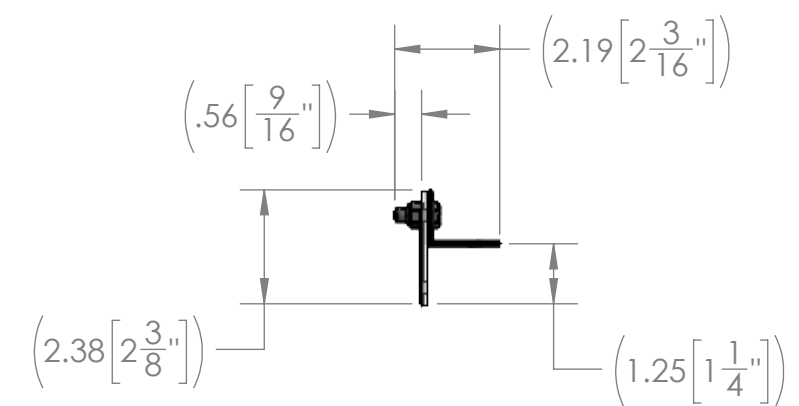
UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div><div>FIRST ROBOTICS COMPETITION</div><div>Modeling Solutions Partner</div></div>	
	DRAWN	CO	12/31/2021		
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE:  Hub - Complex Build - Upper Hub Vision Assembly	
	<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.
C				TE-22200	
DO NOT SCALE DRAWING				SCALE: 1:3	SHEET 1 OF 2

1

D





C



B

A

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	 		
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>          <b>DO NOT SCALE DRAWING</b>		DRAWN	CO	12/31/2021			
		<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.					
		<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.					
TITLE:					Hub - Complex Build - Upper Hub Vision Assembly		
SIZE		DWG. NO.		REV			
C		TE-22200					
SCALE: 1:4			SHEET 2 OF 2				

4

3

2

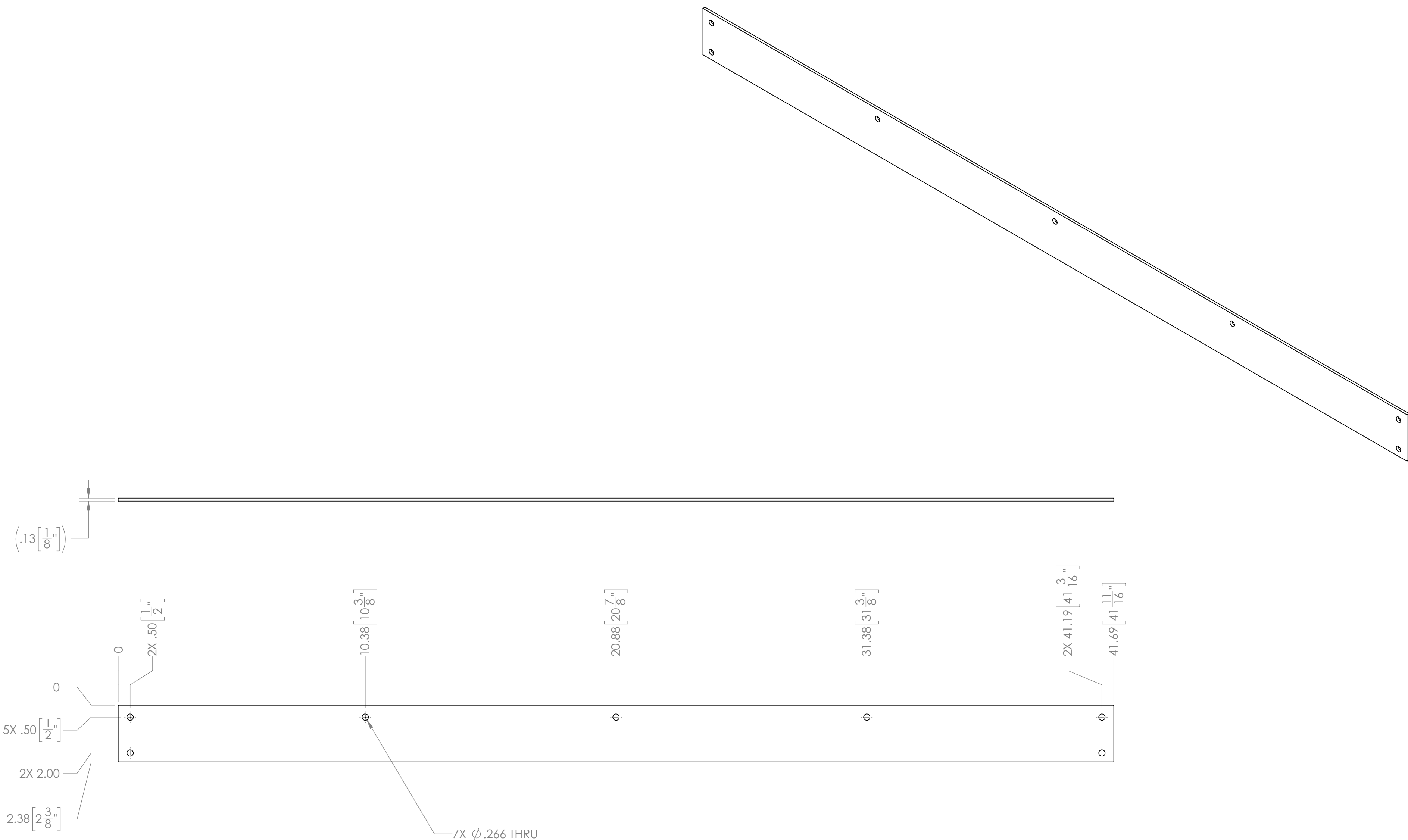
1



D

C

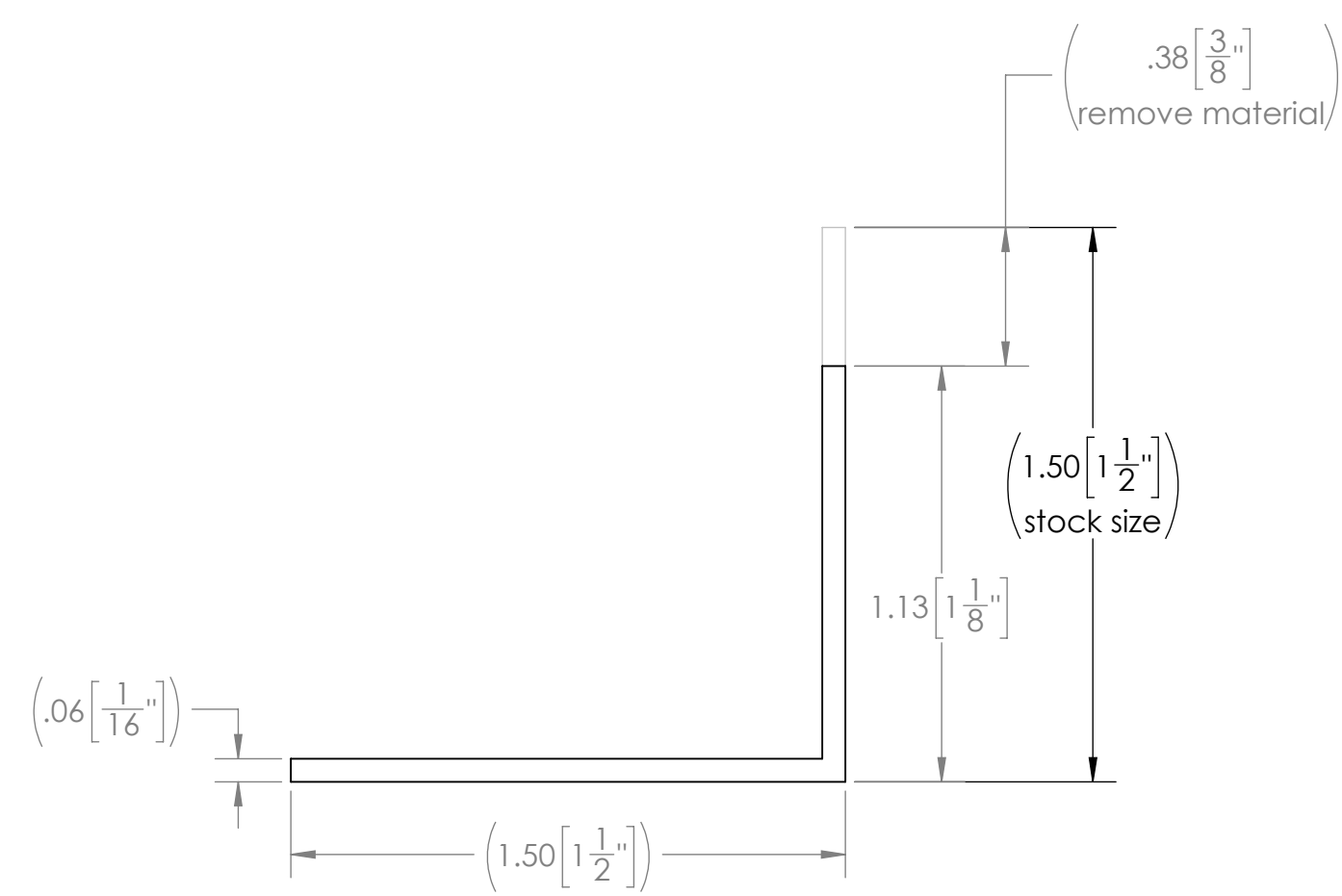
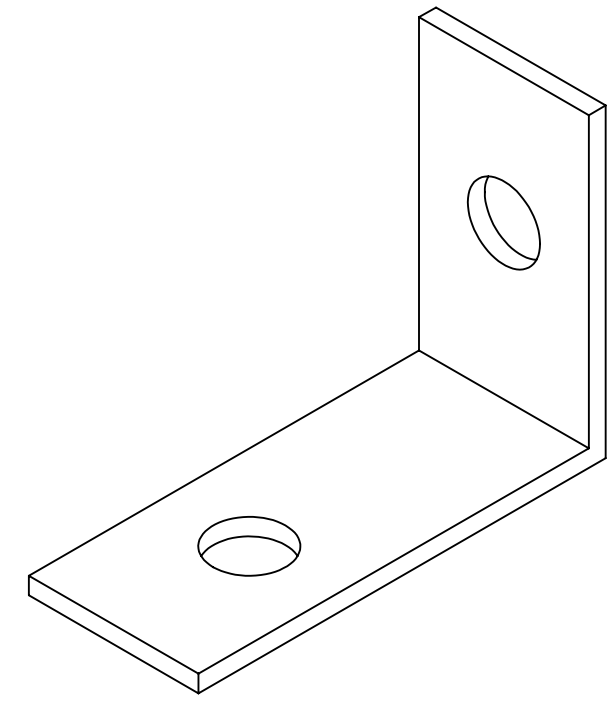
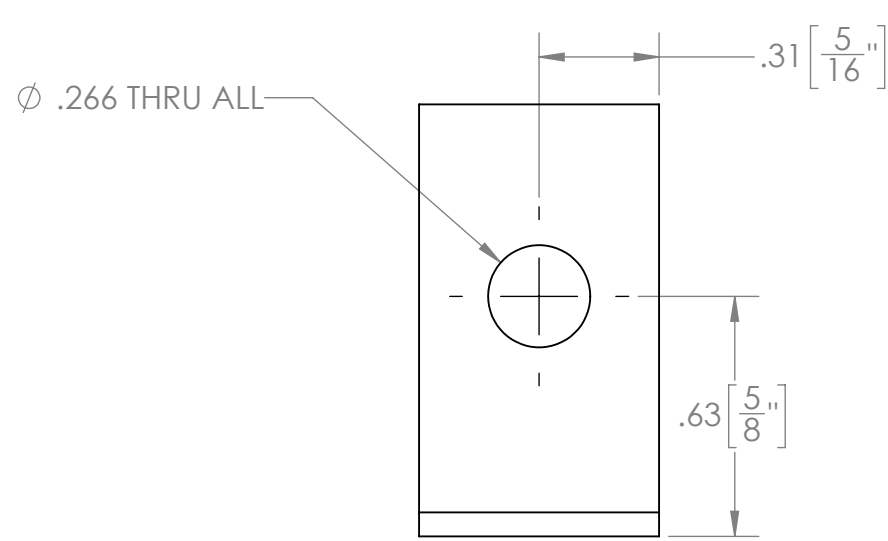
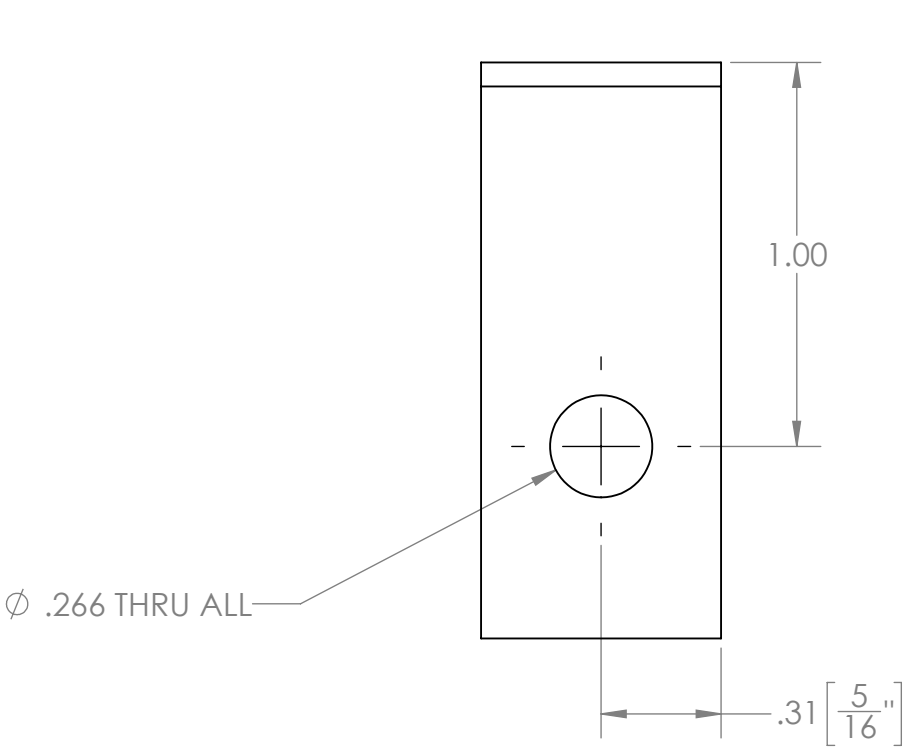
B



A

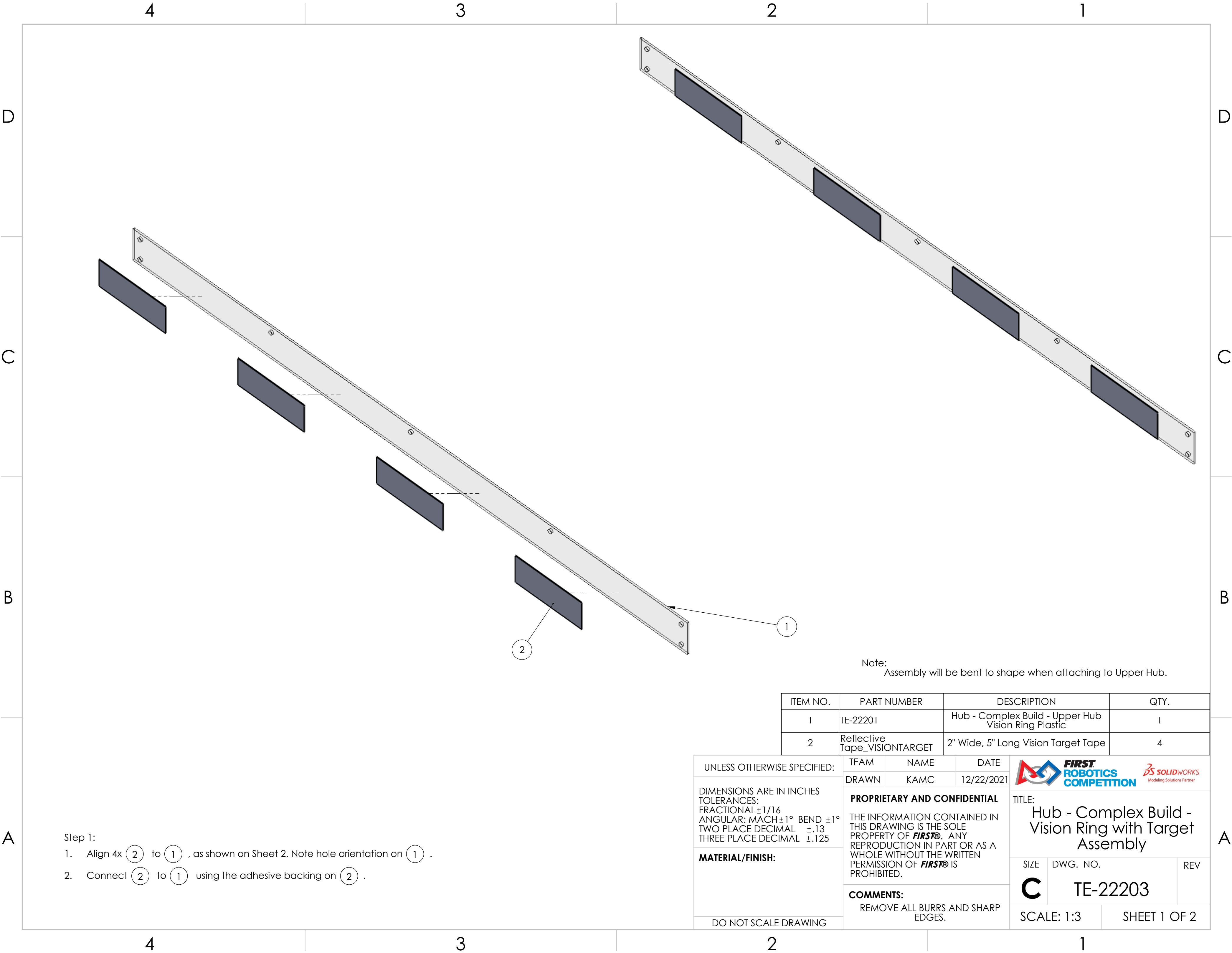


UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	<div> <b>FIRST ROBOTICS COMPETITION</b></div> <div> <b>SOLIDWORKS</b> Modeling Solutions Partner</div>		
		DRAWN	KAMC	12/22/2021	<div>TITLE:</div> <div>Hub - Complex Build - Upper Hub Vision Ring Plastic</div> <div><div>SIZE</div><div>DWG. NO.</div><div>REV</div></div> <div><div>C</div><div>TE-22201</div></div> <div><div>SCALE: 1:3</div><div>SHEET 1 OF 1</div></div>		
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125		<div>PROPRIETARY AND CONFIDENTIAL</div> <div>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.</div>					
<div>MATERIAL/FINISH:</div> <div>1/8" thk. Polycarbonate, Clear</div>		<div>COMMENTS:</div> <div>REMOVE ALL BURRS AND SHARP EDGES.</div>					
DO NOT SCALE DRAWING							







UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  1.5" x 1.5" x .0625" Aluminum Angle, Cut to Size  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div><div></div><div>TITLE: Hub - Complex Build - Upper Hub Vision Ring Bracket</div></div>		
	DRAWN	KAMC	12/22/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE	DWG. NO.	REV
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			<b>C</b>	TE-22202	
SCALE: 2:1		SHEET 1 OF 1				

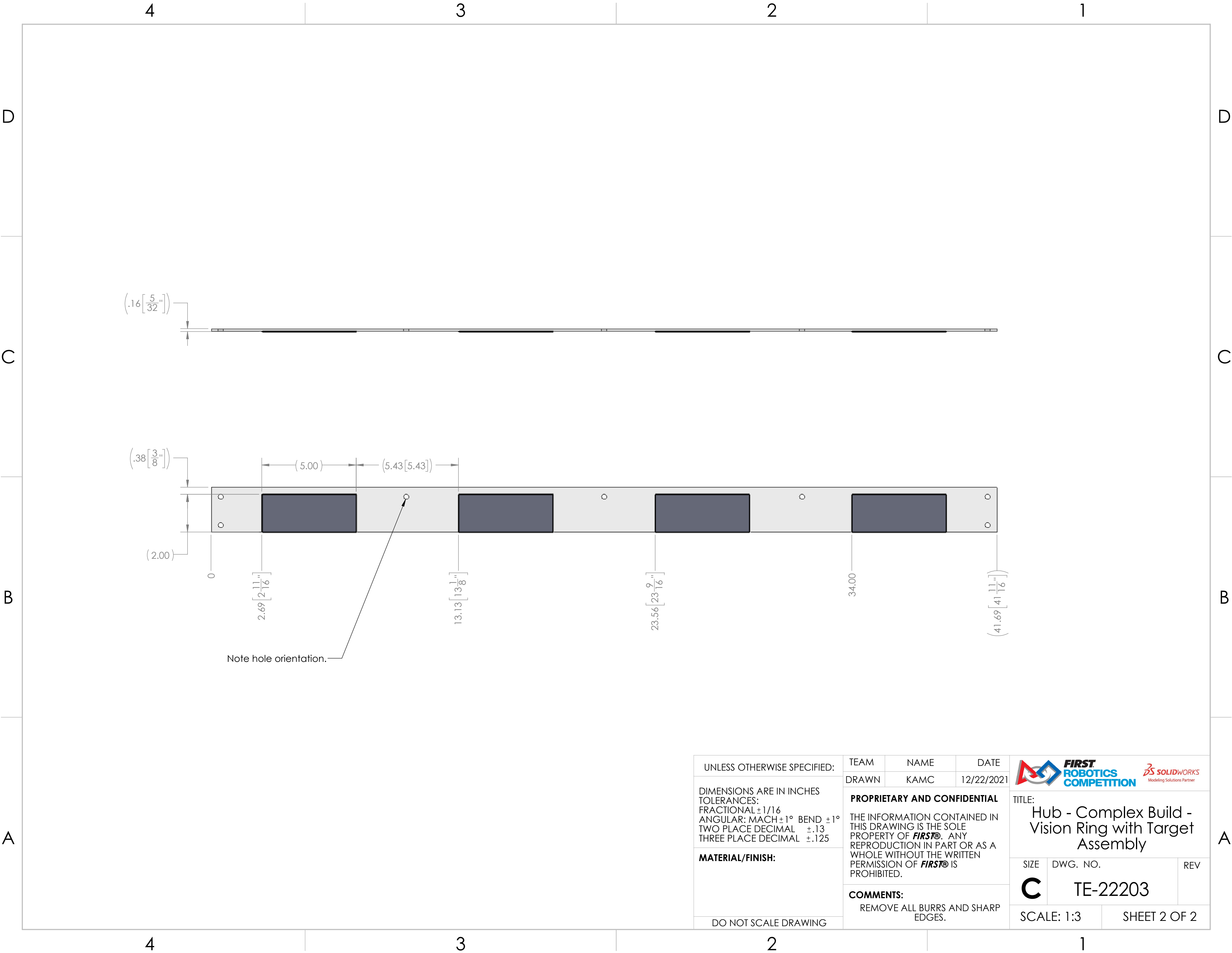




- Step 1:
1. Align 4x (2) to (1) , as shown on Sheet 2. Note hole orientation on (1) .
  2. Connect (2) to (1) using the adhesive backing on (2) .

Note:  
Assembly will be bent to shape when attaching to Upper Hub.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TE-22201	Hub - Complex Build - Upper Hub Vision Ring Plastic	1
2	Reflective Tape_VISIONTARGET	2" Wide, 5" Long Vision Target Tape	4

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	<div><div>FIRST ROBOTICS COMPETITION</div></div> <div><div>SOLIDWORKS Modeling Solutions Partner</div></div>		
	DRAWN	KAMC	12/22/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST</b> ®. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST</b> ® IS PROHIBITED.			TITLE: Hub - Complex Build - Vision Ring with Target Assembly		
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
C				TE-22203		
DO NOT SCALE DRAWING				SCALE: 1:3		SHEET 1 OF 2



UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>     DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div>		
	DRAWN	KAMC	12/22/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.				TITLE: Hub - Complex Build - Vision Ring with Target Assembly	
				SIZE	DWG. NO.	REV
				C	TE-22203	
				SCALE: 1:3		SHEET 2 OF 2



D

D

C

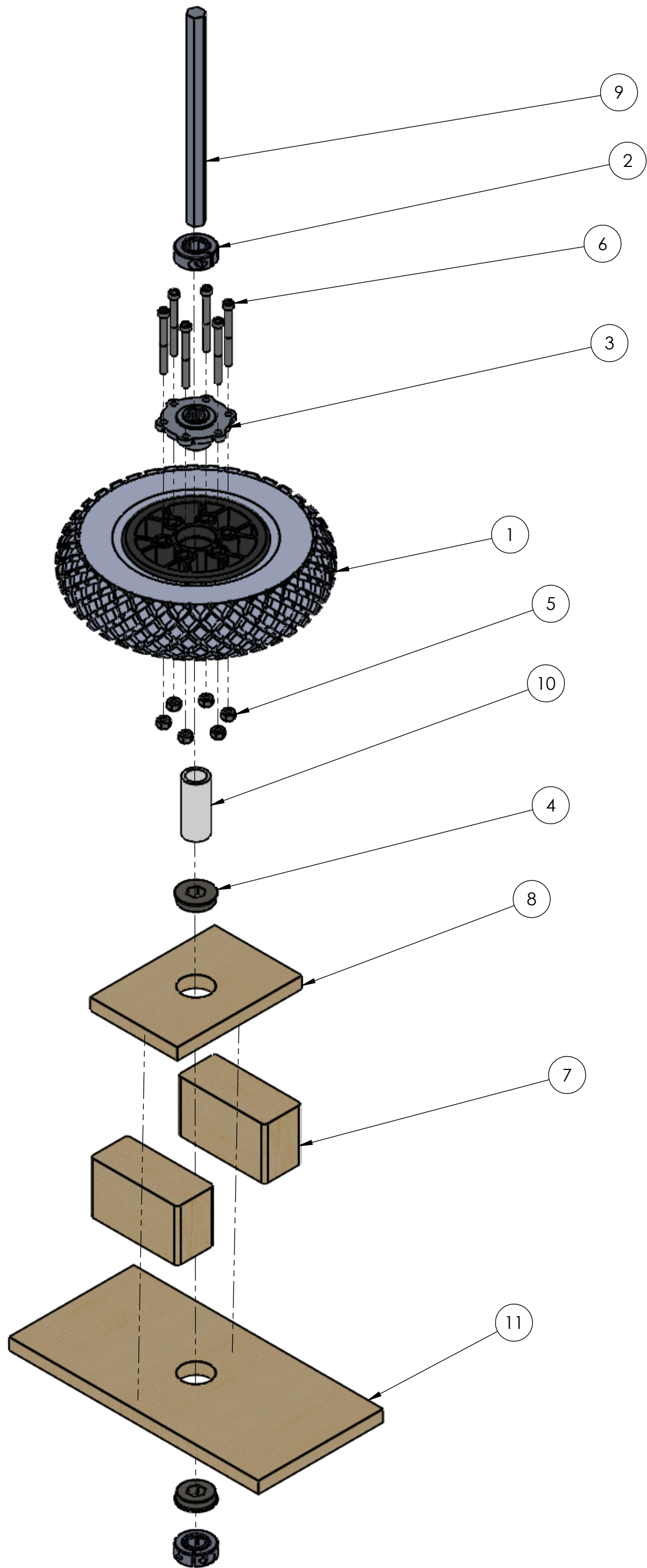
C

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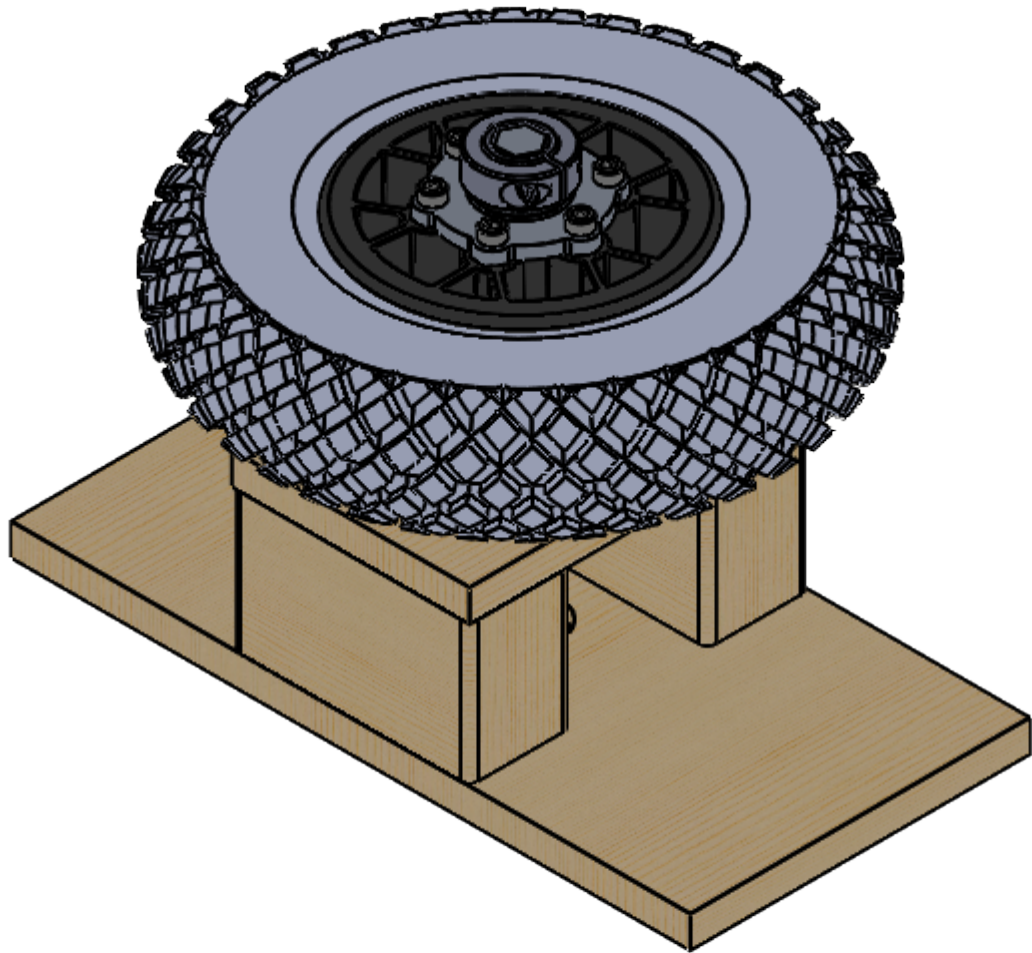
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Notes:



1. Item (2) may be replaced with other equivalent parts. Excess hex shaft resulting from differences of shaft collar widths should protrude out bottom of assembly.



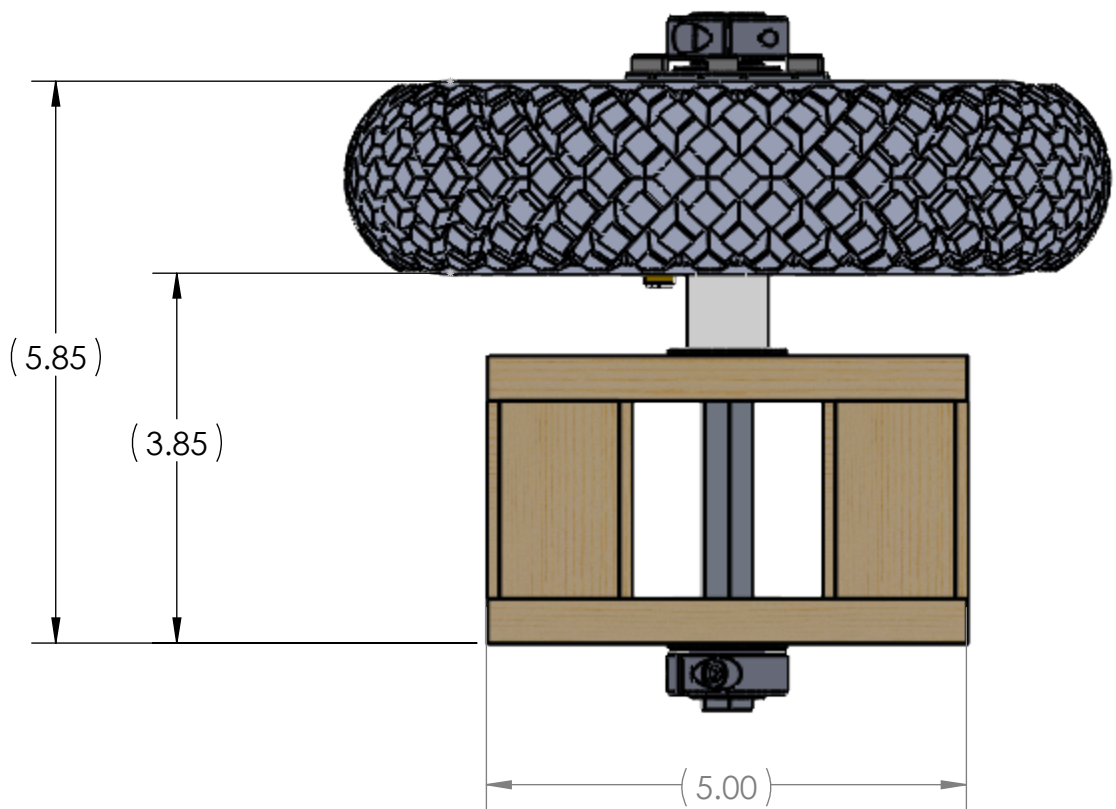
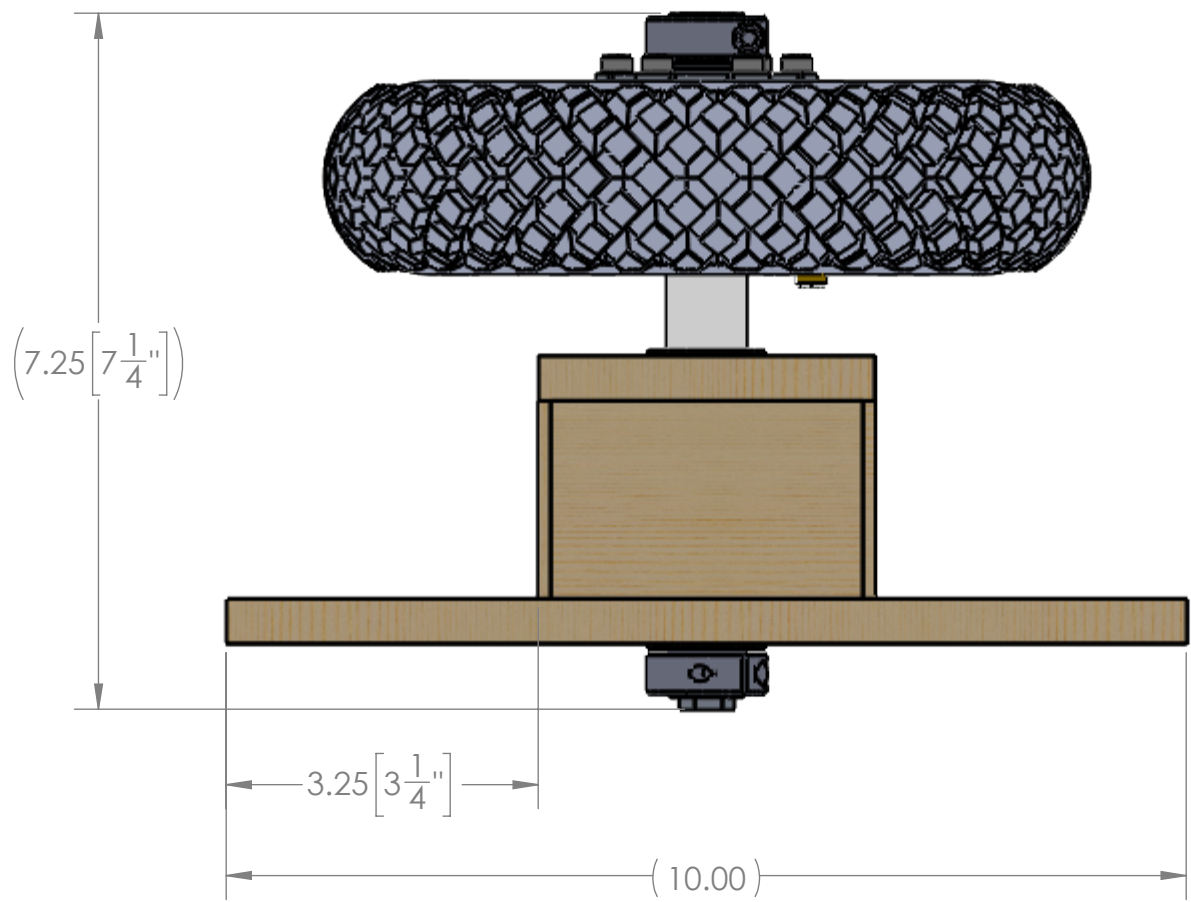
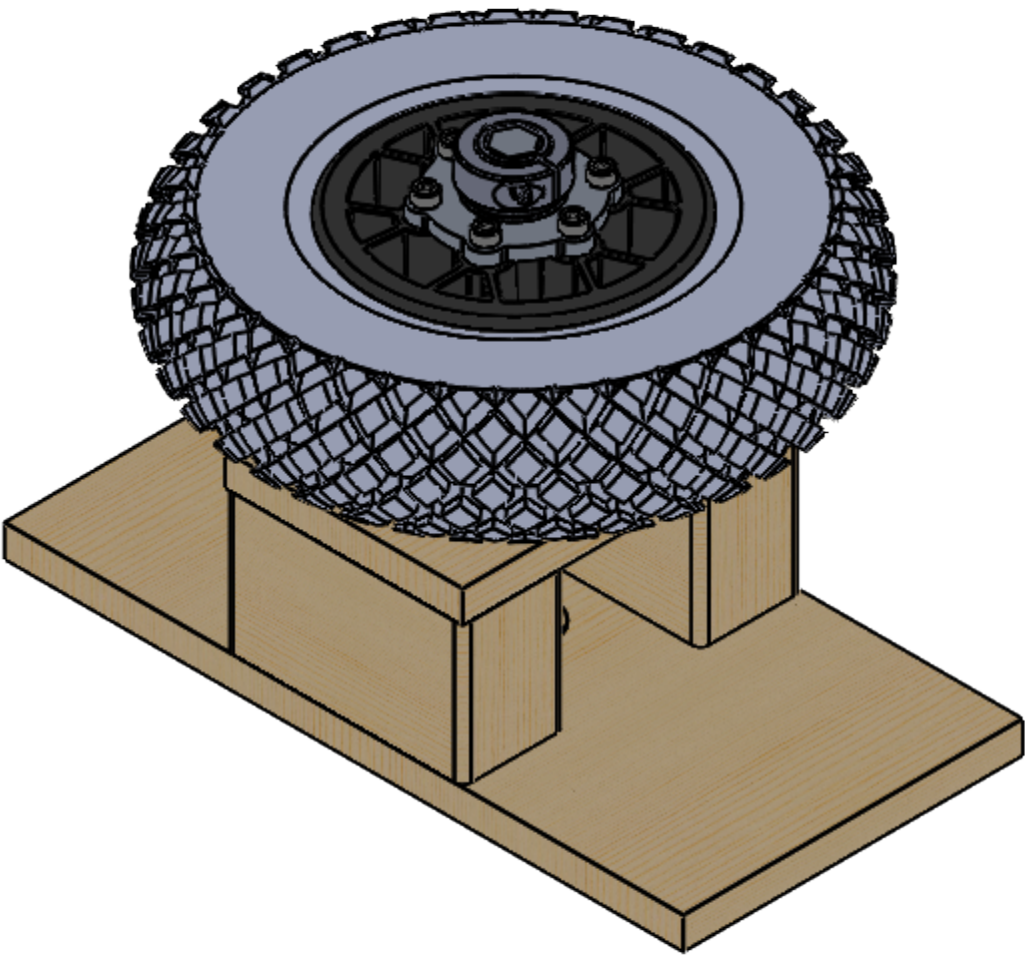
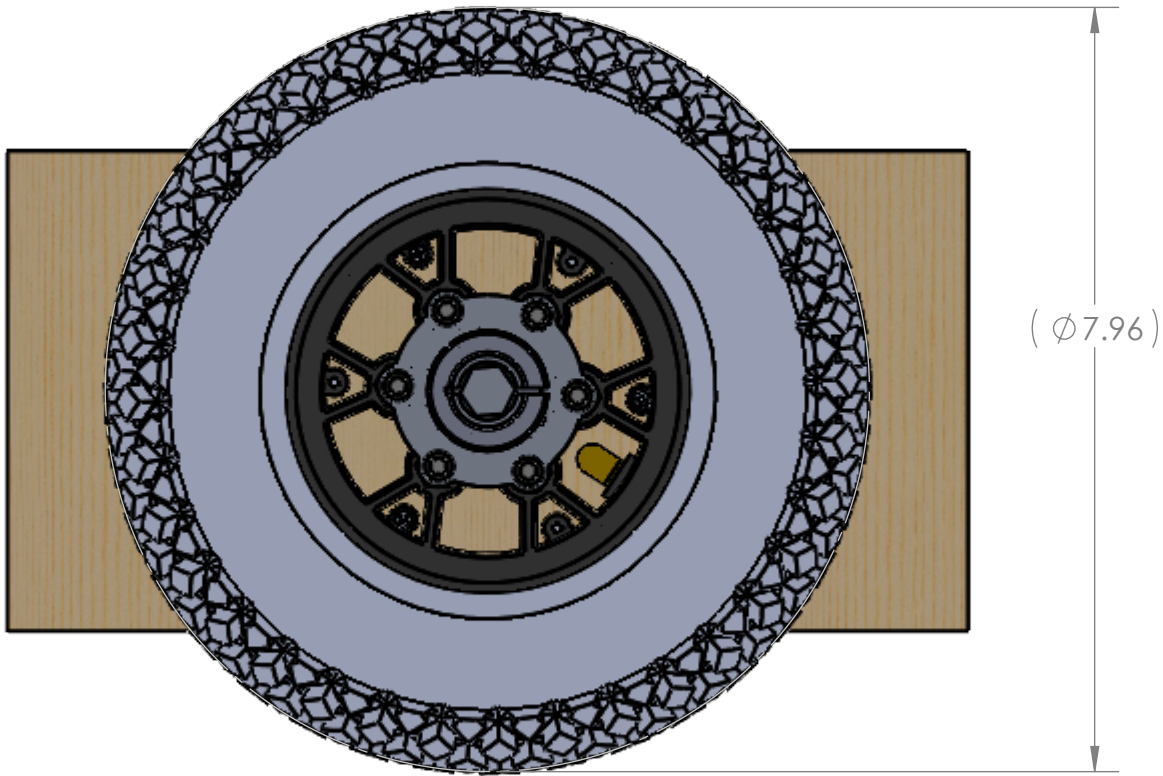
ISO Scale: 1:2



Hardware Needed:  
#8 x 1.25" Long Screw - Qty 4

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	am-0970	8 in. Pneumatic Wheel	1
2	am-1526 500Hex HD Collar Clamp	1/2" hex shaft collar	2
3	am-4124	AndyMark 1/2 in. Hex Hub	1
4	bearing_0.5in_flanged hex	0.5 in. flanged hex bearing	2
5	nylock_10_32	Low-Strength Steel Nylon-Insert Locknut, Zinc-Plated, 10-32 Thread Size	6
6	socket_hex_10_32_2_p artial	Socket Head Screw, 10-32 x 2" long, partially threaded	6
7	TE-22211	Hub - Complex Build - Passive Agitator 2x4	2
8	TE-22212	Hub - Complex Build - Passive Agitator Top	1
9	TE-22213	Hub - Complex Build - Passive Agitator - Shaft	1
10	TE-22214	Hub - Complex Build - Passive Agitator - Spacer	1
11	TE-22215	Hub - Complex Build - Passive Agitator Bottom	1

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	DRAWN	CO	12/22/2021		
	PROPRIETARY AND CONFIDENTIAL			TITLE:  Hub - Complex Build - Passive Agitator	
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COMMENTS:			SIZE	DWG. NO.	REV
			C	TE-22210	
			SCALE: 1:3		SHEET 1 OF 4







UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	 		
	DRAWN	CO	12/22/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			TITLE: Hub - Complex Build - Passive Agitator		
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
				C	TE-22210	
MATERIAL/FINISH:				SCALE: 1:2		SHEET 2 OF 4
DO NOT SCALE DRAWING						

Step 1:  
Fasten 3 to 1 using 6 and 5 .  
3 should be on the opposite face of the valve stem of 1 .

Step 2:  
Press a 4 into 8 .

Step 3:  
Press a 4 into 11 .

UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>    DO NOT SCALE DRAWING	TEAM	NAME	DATE	 		
	DRAWN	CO	12/22/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b> THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.				TITLE: Hub - Complex Build - Passive Agitator	
	<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.				SIZE <b>C</b>	DWG. NO. TE-22210
SCALE: 1:1				SHEET 3 OF 4		

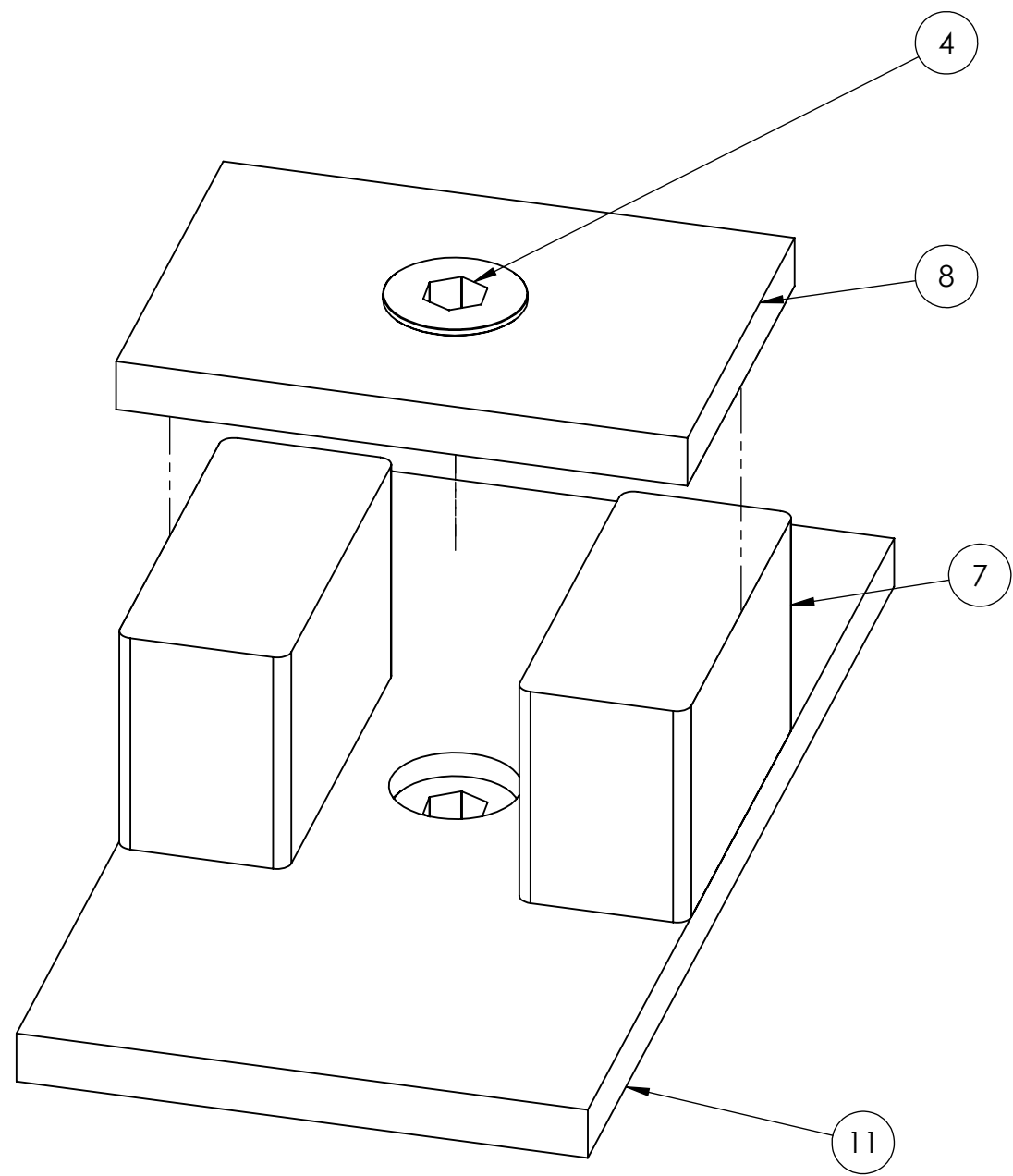


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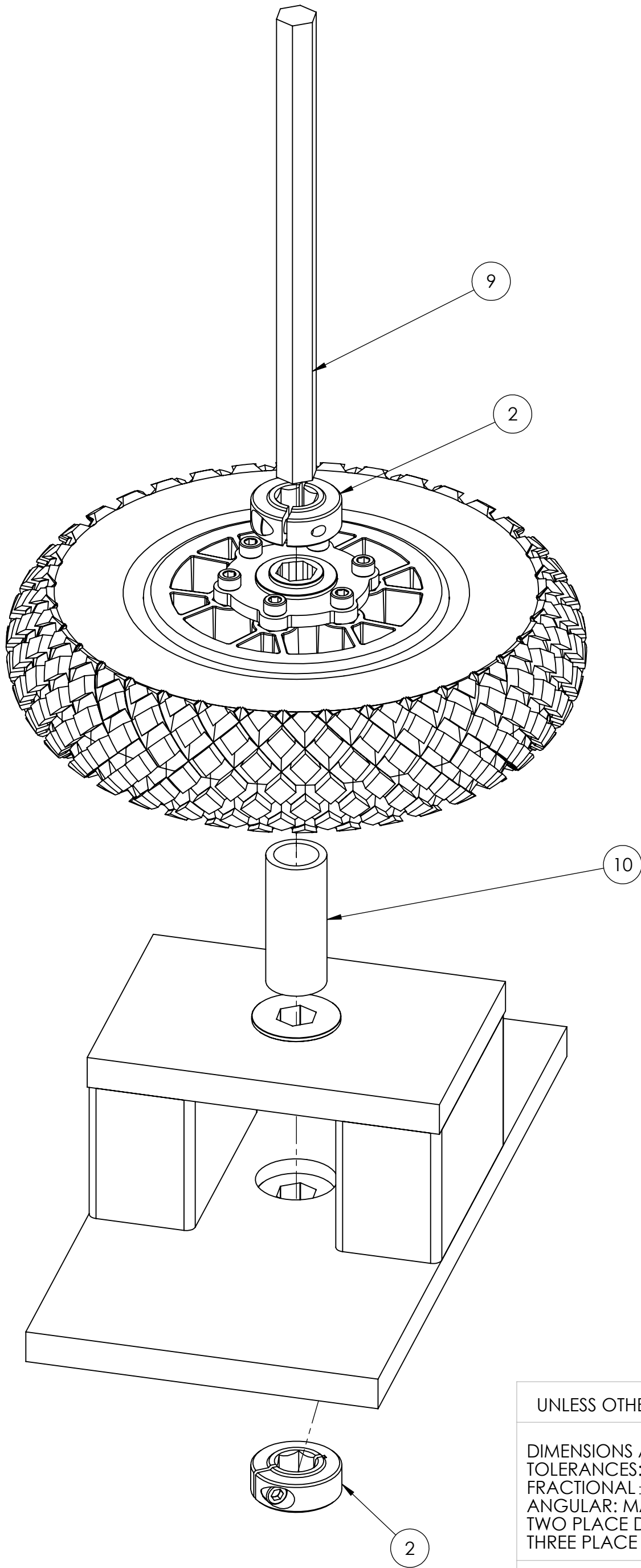
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Step4:  
Attach (11) and (8) to (7) using 1.25" long wood screws. It is recommended to use 4x screws per (7), 2x into each end.  
Note flange orientation of (4) and (11). Flanges should be facing externally.

3



Step 5:  
Slide components onto (9) as shown and tighten each (2).  
Shaft collars should be tightend such that everything is flush and snug.  
Excess shaft length should be adjust to below assembly.

UNLESS OTHERWISE SPECIFIED:		TEAM	NAME	DATE	  		
		DRAWN	CO	12/22/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125		<b>PROPRIETARY AND CONFIDENTIAL</b>			TITLE: Hub - Complex Build - Passive Agitator		
		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.					
		<b>MATERIAL/FINISH:</b>		<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			
DO NOT SCALE DRAWING					SIZE	DWG. NO.	REV
					C	TE-22210	
					SCALE: 2:3		SHEET 4 OF 4

4

3

2

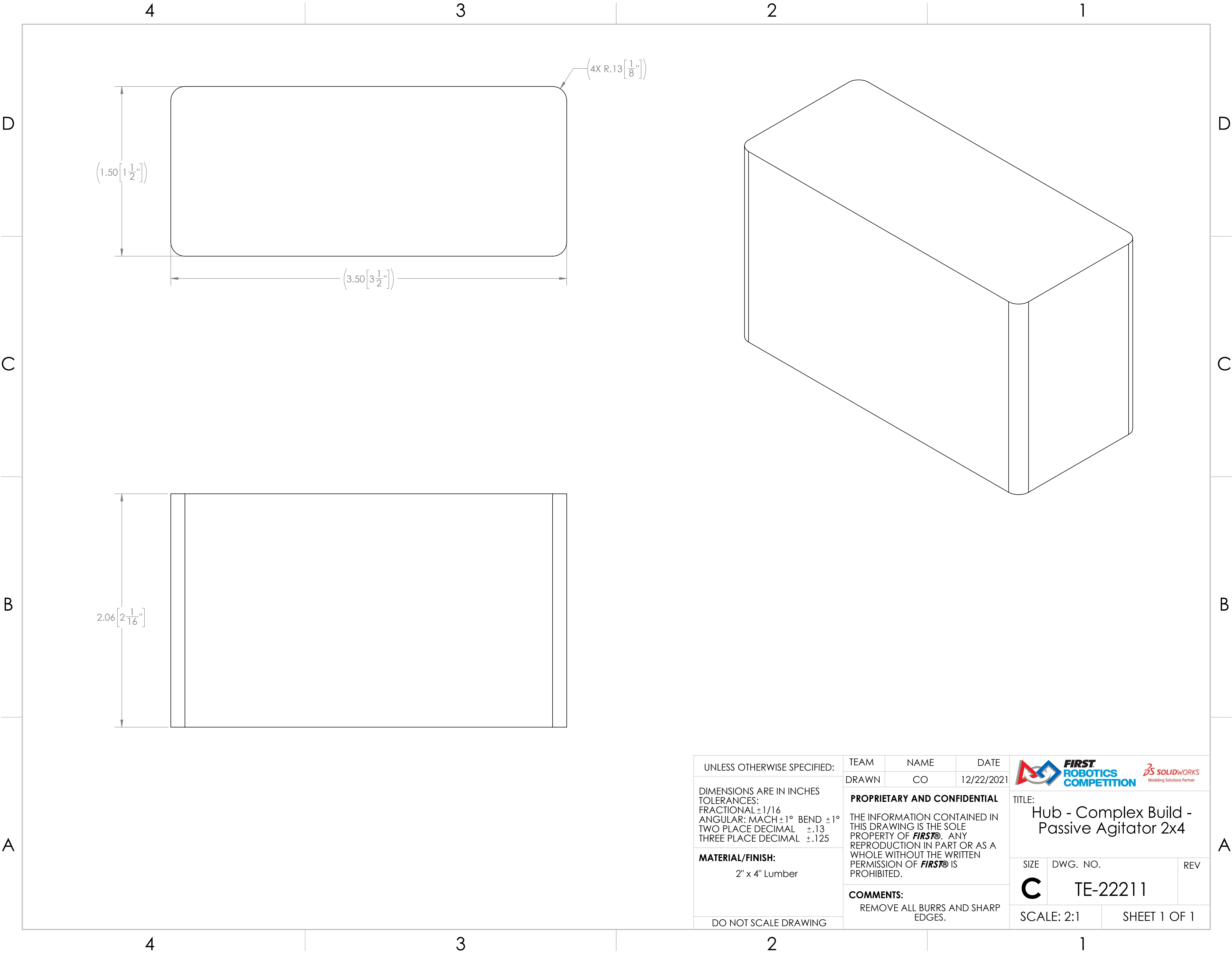
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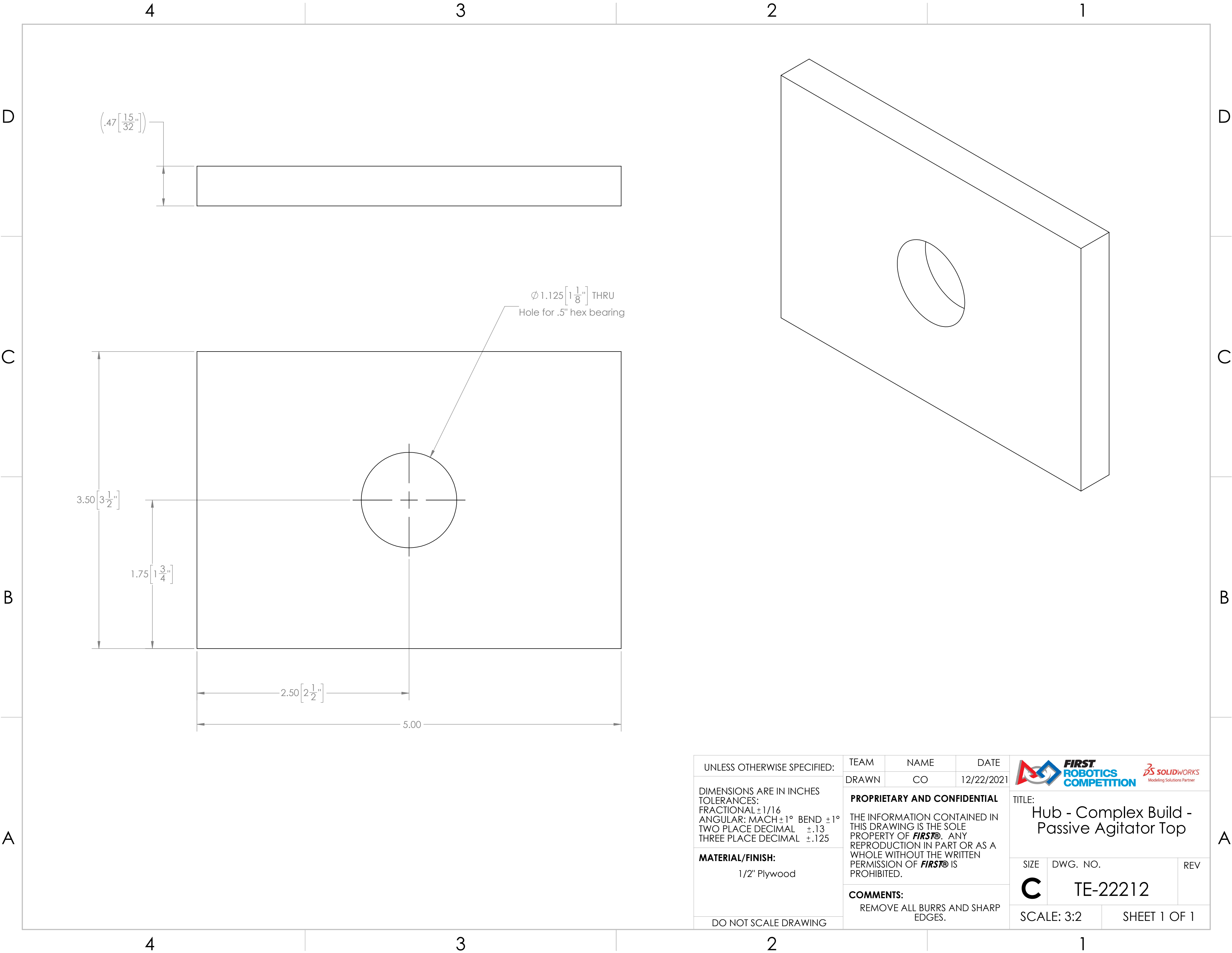
C

B

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UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125  <b>MATERIAL/FINISH:</b>  2" x 4" Lumber   DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div> <div>TITLE: Hub - Complex Build - Passive Agitator 2x4</div>
	DRAWN	CO	12/22/2021	
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			
SIZE		DWG. NO.		REV
C		TE-22211		
SCALE: 2:1			SHEET 1 OF 1	



$(.47 \left[ \frac{15}{32} \right])$



$\varnothing 1.125 \left[ 1 \frac{1}{8} \right]$  THRU  
Hole for .5" hex bearing

$3.50 \left[ 3 \frac{1}{2} \right]$

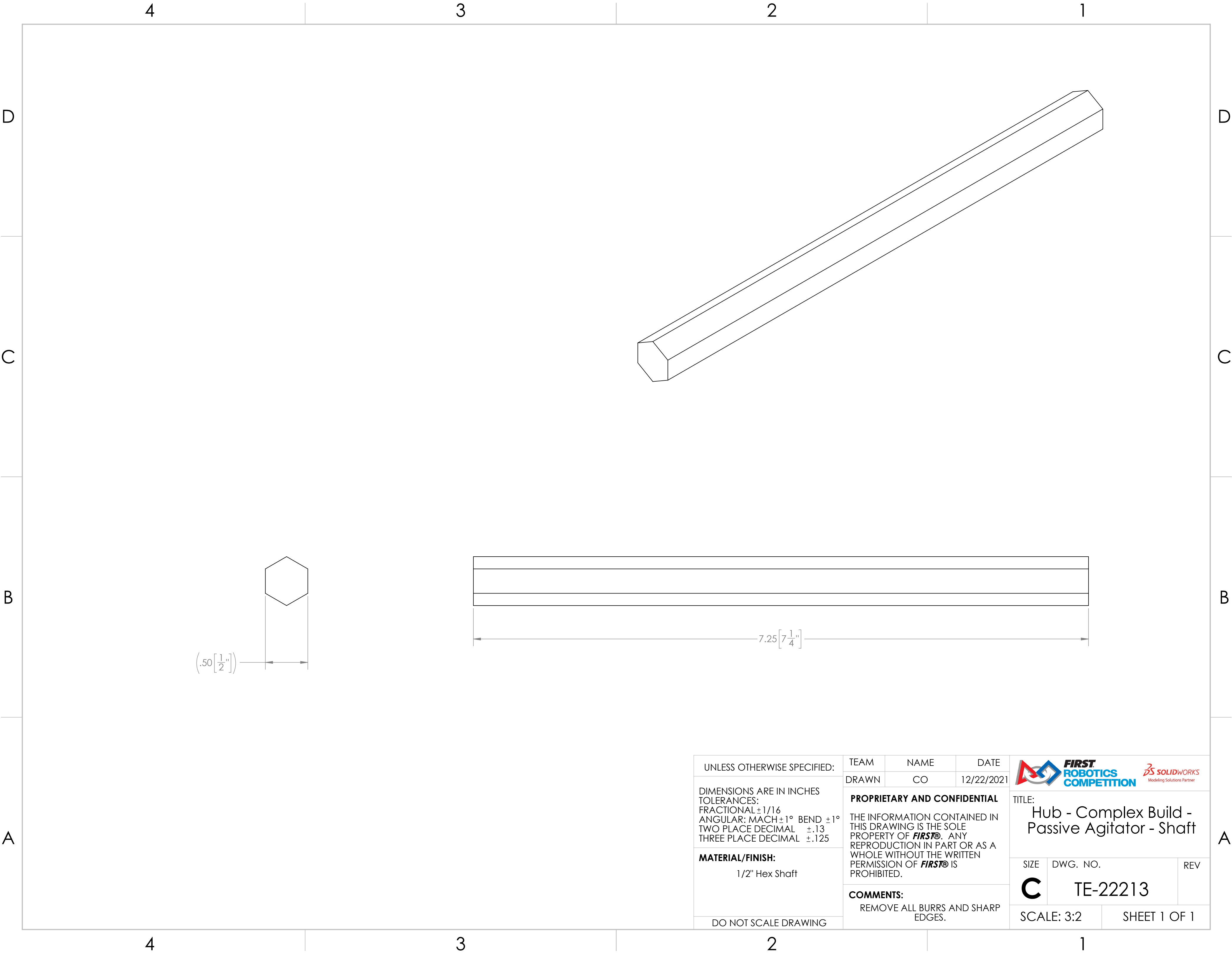
$1.75 \left[ 1 \frac{3}{4} \right]$



$2.50 \left[ 2 \frac{1}{2} \right]$

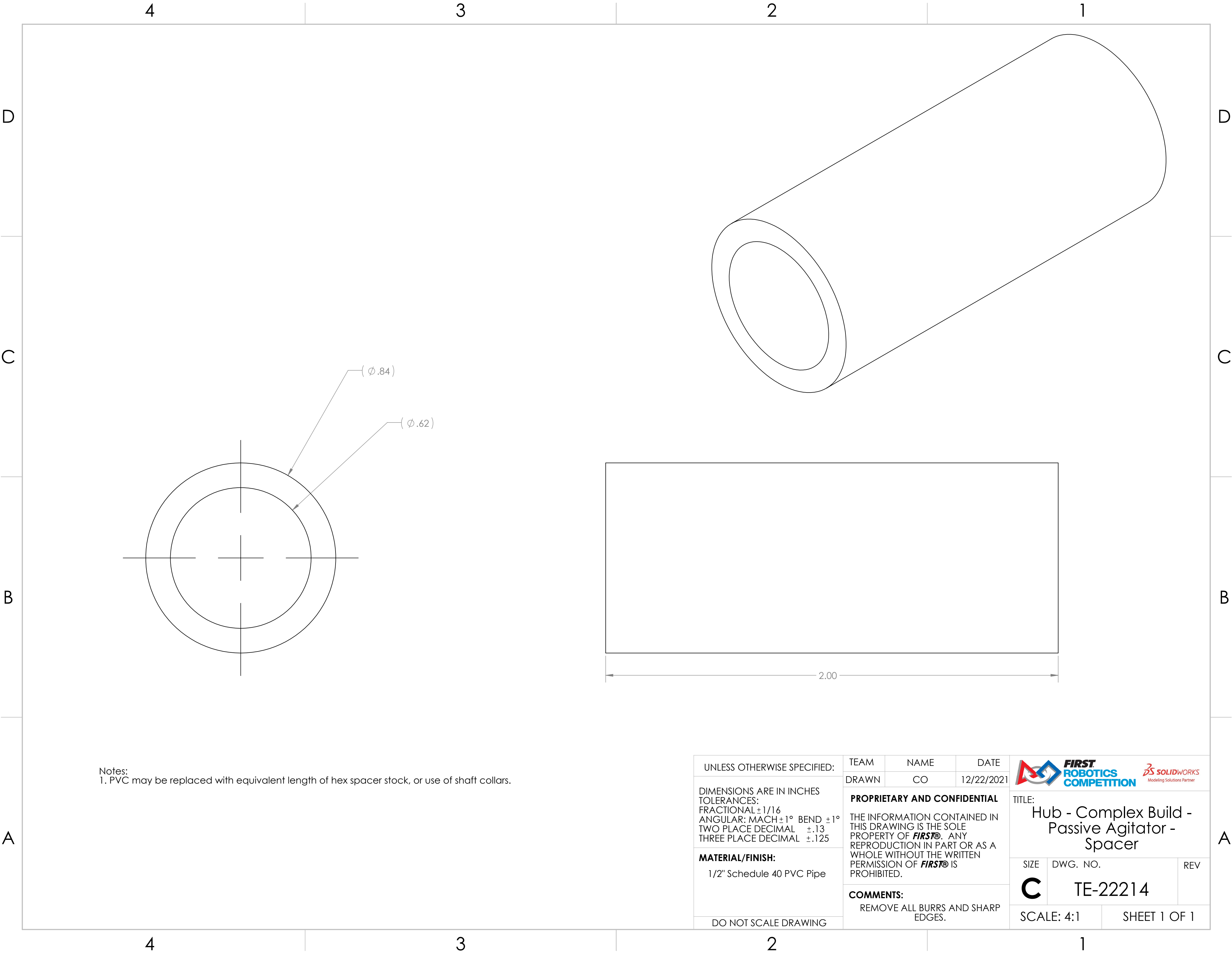
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UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>  1/2" Plywood  DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div> <div>TITLE: Hub - Complex Build - Passive Agitator Top</div>		
	DRAWN	CO	12/22/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>  THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.  <b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.				SIZE <b>C</b>	DWG. NO. TE-22212
		SCALE: 3:2		SHEET 1 OF 1		







UNLESS OTHERWISE SPECIFIED:  DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/16$ ANGULAR: MACH $\pm 1^\circ$ BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .13$ THREE PLACE DECIMAL $\pm .125$  <b>MATERIAL/FINISH:</b>  1/2" Hex Shaft   DO NOT SCALE DRAWING	TEAM	NAME	DATE	<div></div>		
	DRAWN	CO	12/22/2021			
	<b>PROPRIETARY AND CONFIDENTIAL</b>			TITLE: Hub - Complex Build - Passive Agitator - Shaft		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			SIZE <b>C</b>	DWG. NO. TE-22213	REV
<b>COMMENTS:</b> REMOVE ALL BURRS AND SHARP EDGES.			SCALE: 3:2		SHEET 1 OF 1	



Notes:  
1. PVC may be replaced with equivalent length of hex spacer stock, or use of shaft collars.

UNLESS OTHERWISE SPECIFIED:	TEAM	NAME	DATE	 		
	DRAWN	CO	12/22/2021			
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ±1° BEND ±1° TWO PLACE DECIMAL ±.13 THREE PLACE DECIMAL ±.125	<b>PROPRIETARY AND CONFIDENTIAL</b>			TITLE:		
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <b>FIRST®</b> . ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <b>FIRST®</b> IS PROHIBITED.			Hub - Complex Build - Passive Agitator - Spacer		
<b>MATERIAL/FINISH:</b>  1/2" Schedule 40 PVC Pipe	<b>COMMENTS:</b>  REMOVE ALL BURRS AND SHARP EDGES.			SIZE	DWG. NO.	REV
				C	TE-22214	
DO NOT SCALE DRAWING				SCALE: 4:1		SHEET 1 OF 1

