

2025-2026 **FIRST®** Tech Challenge

Initial FIELD Element Assembly Guide

**DECODE**PRESENTED BY  **RTX****FIRST®
TECH
CHALLENGE**

Initial FIELD Element Assembly Guide

This guide includes instructions to assemble the FIELD elements used in the construction of a DECODE FIELD. Please refer to the companion “Event FIELD Setup Guide” for instructions on installing the FIELD elements and completing the DECODE FIELD assembly.

Note: this guide includes instructions for assembling a “partial” set of elements as well as a full set.

Contents



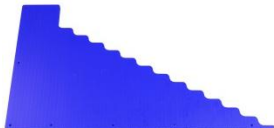

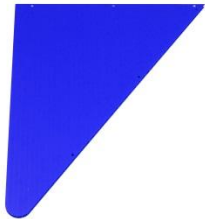



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1 Recommended Tools

Component	Part #	Quantity	Photo
Utility Knife	N/A	1	
Tape Measure	am-4986	1	
5/32 in. Hex Driver	am-2751	1	
3/8 in. Combination Wrench	am-4961	1	
3/8 in. Nut Driver	am-3877	1	
1/2 in. Combination Wrench	am-2746	1	
3/8 in. Impact Nutsetter	am-2755	1	
Drill	N/A	1	
Safety Gloves	N/A	1	
Flush Cutters	am-3910a	1	
Carpenter Square	N/A	1	

2 Parts List


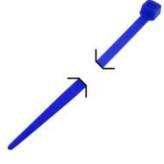






Component	Part #	Quantity		Photo
		Full	Part	
Green ARTIFACT	am-3376a_green	12	6	
Purple ARTIFACT	am-3376a_purple	24	12	
ARTIFACT Tray	am-5706	2	1	
GOAL Front Panel (Red)	am-5716_rs	1	0/1	
GOAL Front Panel (Blue)	am-5716_bs	1	0/1	
GOAL Rear Panel (Red)	am-5717_red	2	0/2	

Component	Part #	Quantity		Photo
		Full	Part	
GOAL Rear Panel (Blue)	am-5717_blue	2	0/2	
GOAL Backboard Panel (Red)	am-5718_red	2	0/2	
GOAL Backboard Panel (Blue)	am-5718_blue	2	0/2	
GOAL Internal RAMP (Red)	am-5721_red	1	0/1	
GOAL Internal RAMP (Blue)	am-5721_blue	1	0/1	
GOAL Archway (Red)	am-5730_red	1	0/1	
GOAL Archway (Blue)	am-5730_blue	1	0/1	
Lower RAMP Blocker Large (Red)	am-5731_red	1	0/1	

Component	Part #	Quantity		Photo
		Full	Part	
Lower RAMP Blocker Large (Blue)	am-5731_blue	1	0/1	
Lower RAMP Blocker Small (Red)	am-5735_red	1	0/1	
Lower RAMP Blocker Small (Blue)	am-5735_blue	1	0/1	
Lower RAMP Support	am-5737	2	1	
10-32 x 0.5 in. long Screw	am-1002	16	8	
10-32 x 0.875 in. long Screw	am-1753	16	8	
#10 Nylock Nut	am-1042	36	18	
#10 Washer	am-1026	18	9	
1/4-20 x 0.75 in. long Threadforming Screw	am-1310	52	26	
Upper RAMP Large Bracket	am-5719	2	1	

Component	Part #	Quantity		Photo
		Full	Part	
Upper RAMP Small Bracket	am-5720	2	1	
GOAL Border Clip	am-5722	4	2	
Upper RAMP Mount	am-5723	2	1	
RAMP 28 in. Peanut Extrusion	am-5725	4	2	
RAMP 45 in. Peanut Extrusion	am-5733	4	2	
Hat 6.25 in. Churro Extrusion	am-5724	4	2	
RAMP 45 in. Churro Extrusion	am-5734	6	3	
Undertile Disk	am-5422	4	2	

Component	Part #	Quantity		Photo
		Full	Part	
1/4-20 x 1.25 in. long Hex Head Cap Screw	am-1738	4	2	
1/4-20 Wing nut	am-1705	4	2	
RAMP Support Bracket	am-5726	4	2	
RAMP End Bracket	am-5727	2	1	
GATE Arm	am-5728a	2	1	
M5 Flanged Bearing	am-5469	4	2	
9/32 in. #10 Spacer	am-1757	2	1	
1/2 in. 10 Spacer	am-1758	2	1	
2.5 in. 10-32 Screw	am-1024	2	1	
1 in. Spacer	am-1696	4	2	
1.5 in. 10-32 Screw	am-1014	2	1	

Component	Part #	Quantity		Photo
		Full	Part	
Red Cable Ties (consumed with each build)	am-1552_red (or equivalent)	100	0/100	
Blue Cable Ties (consumed with each build)	am-1552_blue (or equivalent)	100	0/100	
OBELISK Panel	am-5714	3	3	
OBELISK Sticker, ID21	am-5704_id21	1	1	
OBELISK Sticker, ID22	am-5704_id22	1	1	
OBELISK Sticker, ID23	am-5704_id23	1	1	
FIRST Tech Challenge Sticker	am-5708	2	1	
Do NOT Use - Please Disregard: Large Plastic Gate Spacer 0.192 in. ID x 0.625 in. OD x 0.500 in. Long		2	1	

3 Fasteners & Tightness

There are no specifications for torquing the various fasteners used on the *FIRST* Tech Challenge FIELD. Unless otherwise noted, all fasteners should be fully tightened as part of the assembly process.

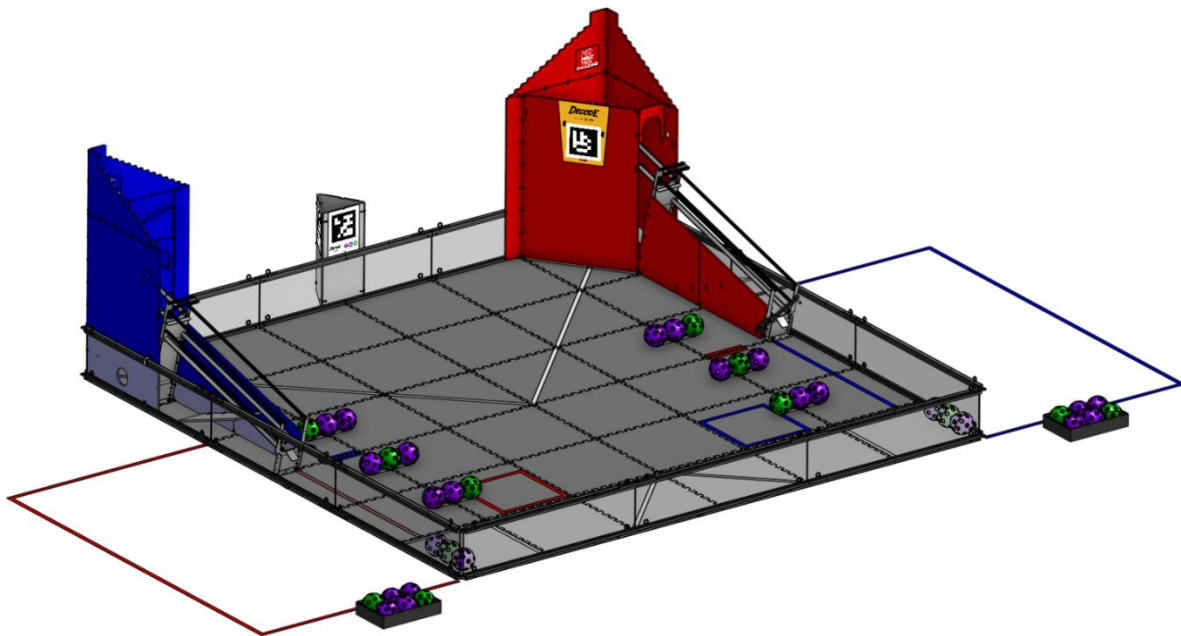
For general reference:

- No fasteners should deform the items being connected.
- Threadforming screws should be tightened until no threads are visible.
 - When threaded into Churro Extrusion, they should be tightened until the Churro Extrusion can no longer rotate when spun by hand.
- Screws threading into nylock nuts should be tightened until no threads are visible between the screw head and nut, and the nut/screw combination can no longer rotate when spun by hand.
- Initial assembly may require loosely attaching Cable Ties to enable correct assembly.
 - Fully secured Cable Ties should be tightened until they can no longer be pulled further by hand, and the objects being connected do not move relative to each other.

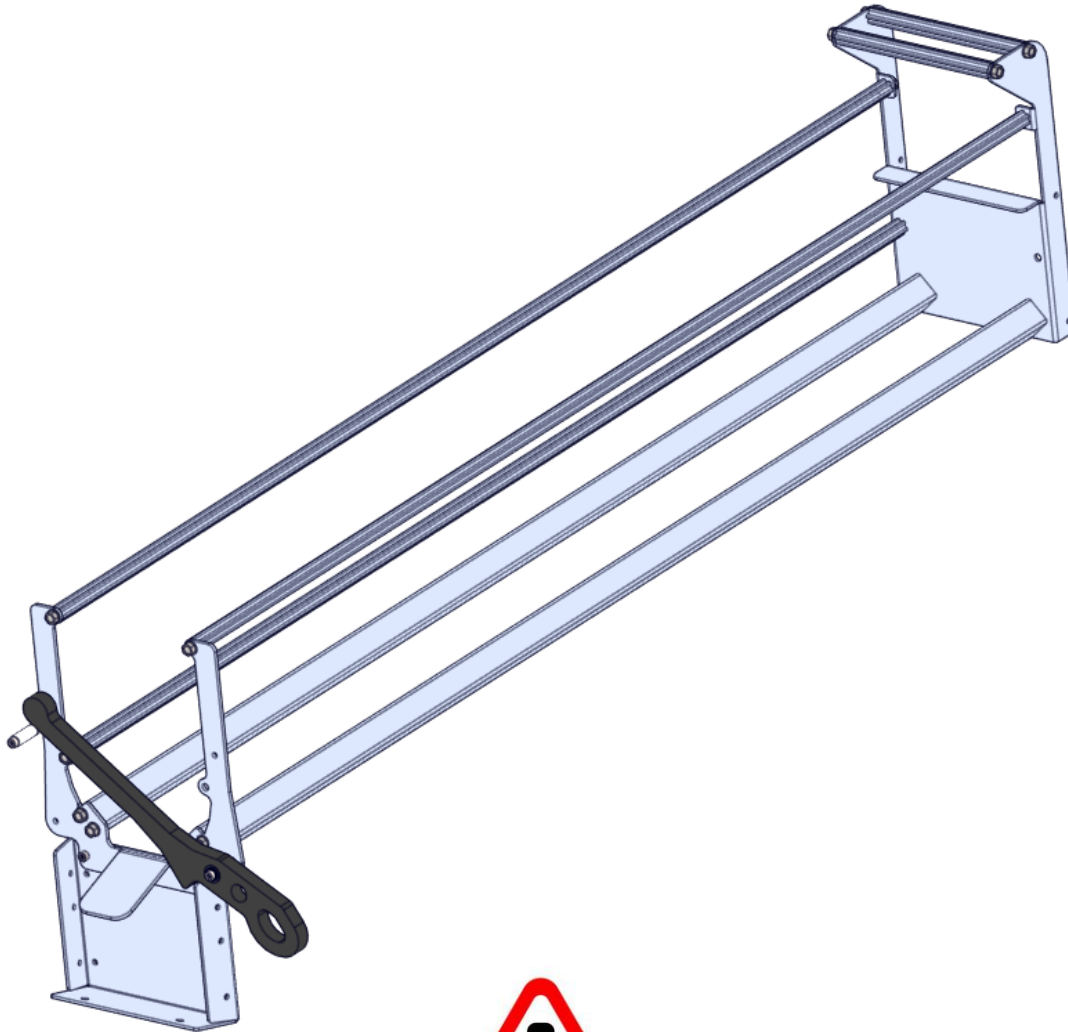
4 FIELD & Perimeter Assembly

This guide includes instructions for building the FIELD elements used in the construction of a FIELD to play the 2025-2026 *FIRST* Tech Challenge game, DECODE. It does not include the full details for assembly of a FIELD on-site at an event.

These FIELD elements can be pre-assembled to save time during event setup, and the steps outlined in this guide can be done off-site, before the event setup day.



Lower RAMP Assembly



WARNING

Metal parts MAY have sharp edges. Be careful when handling them. Using gloves is recommended. Sharp edges can be deburred with a deburring tool or sandpaper.

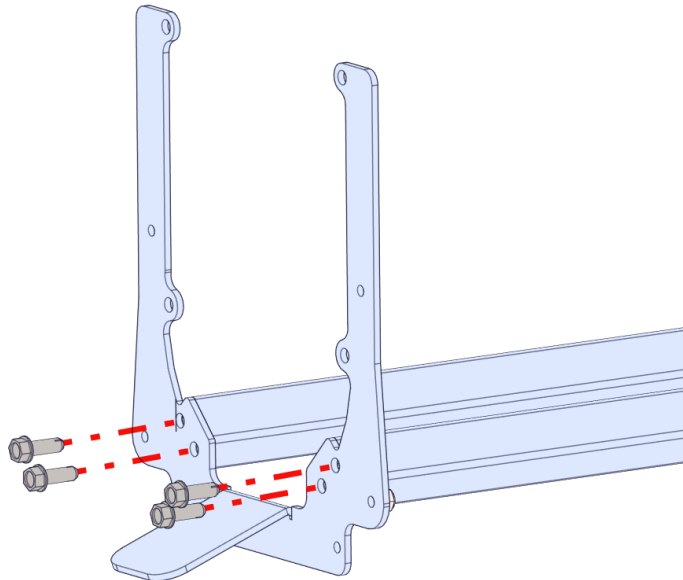
5 Lower RAMP Assembly

Step 1

Affix [2] 45 in. peanut extrusions (am-5733) to each of [2] RAMP End Brackets (am-5727) using [4] 1/4-20 Threadforming Screws (am-1310). Note that the “tongue” of the RAMP End Bracket always faces away from the peanut extrusion. (Repeat this step for each Lower RAMP).



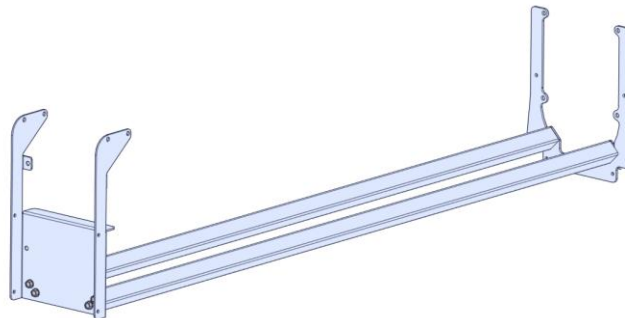
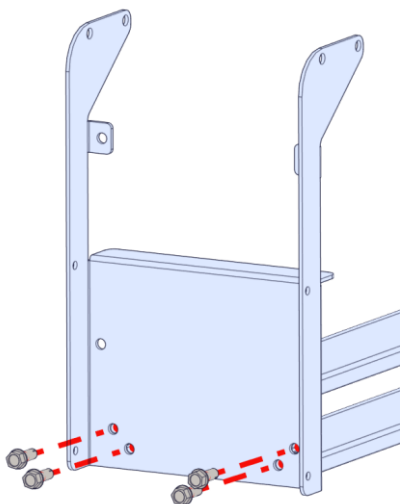
am-1310



2X

Step 2

Attach [1] Upper RAMP Small Bracket (am-5720) to each pair of peanut extrusions connected to each RAMP End Bracket in Step 1 using [4] 1/4-20 Threadforming Screws (am-1310) on each Lower RAMP Assembly. (Repeat this step for each Lower RAMP).

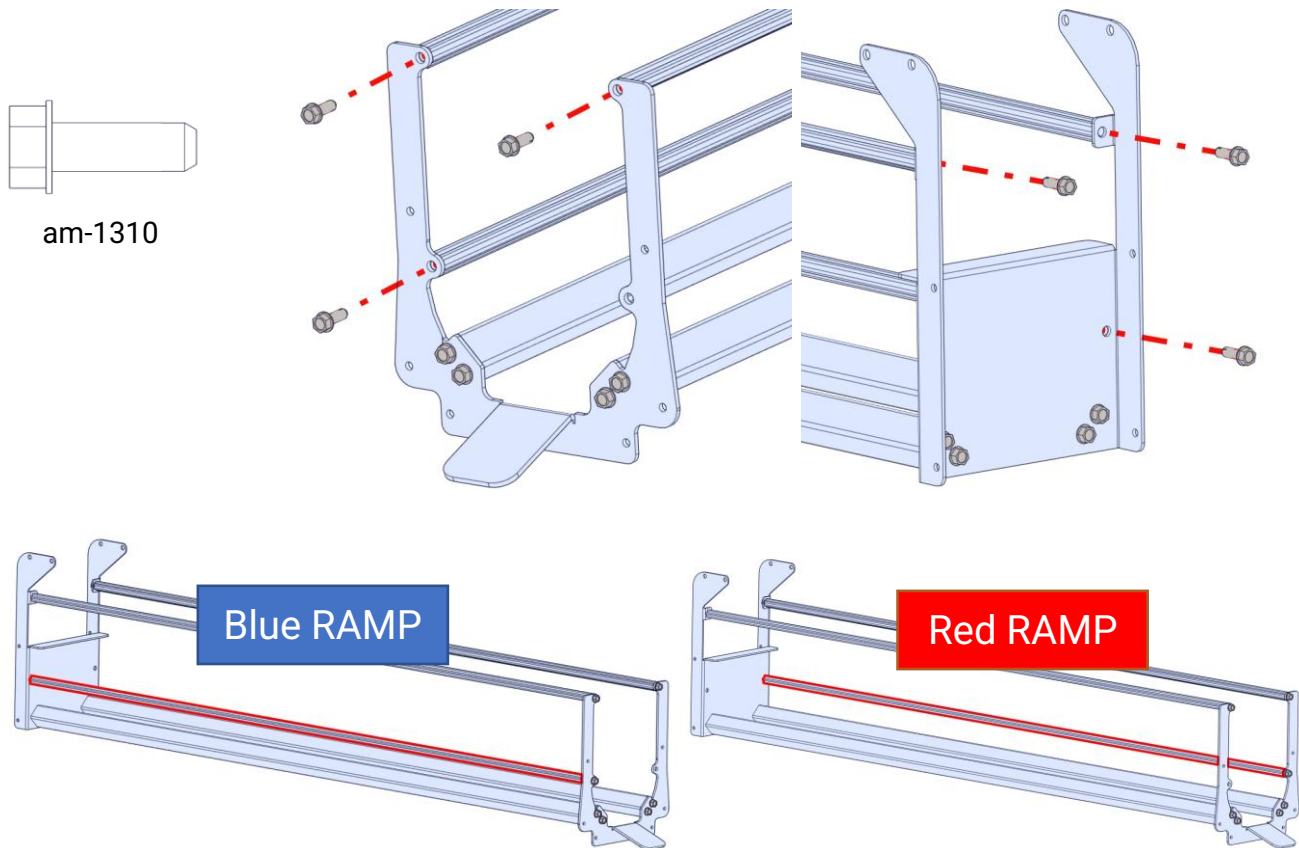


2X

Step 3

Affix [3] 45 in. churro extrusions (am-5734) to the assembly as shown using [6] 1/4-20 Threadforming Screws (am-1310), installing [1] screw at each end. You can use a 1/2 in. wrench to prevent rotation of the churro.

Note that the churros are mounted in different locations using different sets of holes for each RAMP.



Warning: Ensure Lower RAMP is Properly Aligned

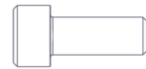
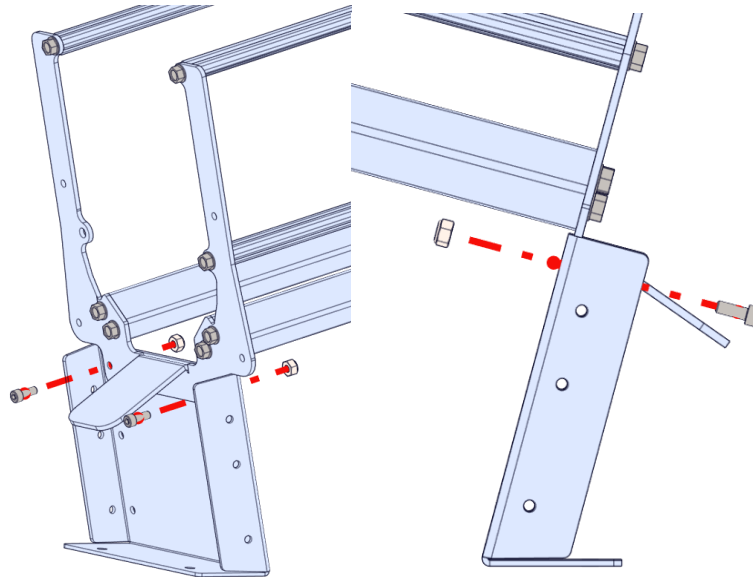
During assembly the RAMPS may be built with a slight "twist." To ensure proper RAMP function, make sure both RAMPS sit flat when placed on a flat level surface, with no twist down their length.

Step 4

Attach [1] RAMP Support Bracket (am-5726) to each Lower RAMP Assembly using [2] 0.5 in. long 10-32 screws (am-1002) and [2] 10-32 Nylock Nuts (am-1042) on each Lower RAMP Assembly. Tighten completely.



am-1042

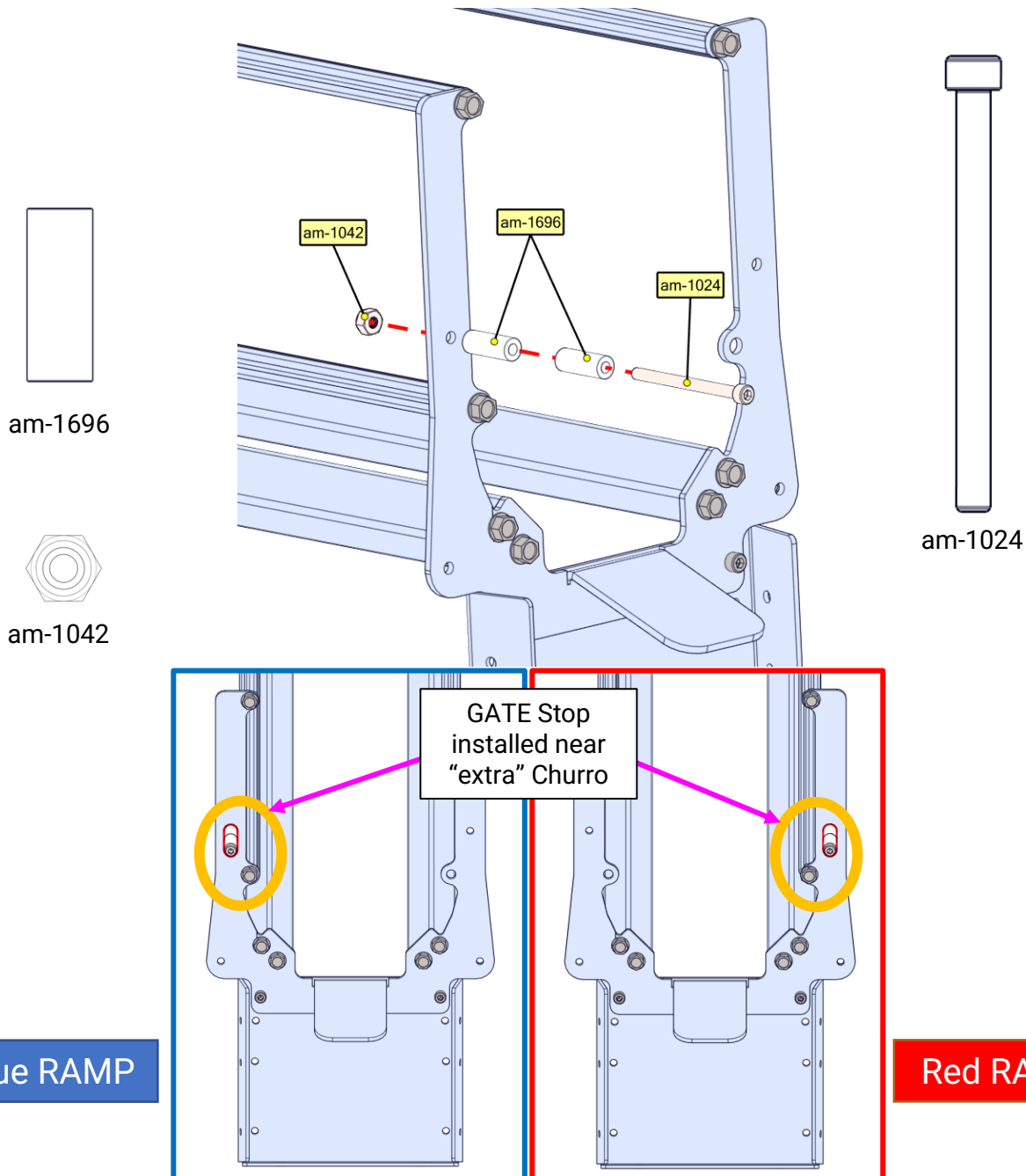


am-1002

2X

Step 5

Create a GATE Stop on each Lower RAMP Assembly by sliding [2] 1 in. spacers (am-1696) over [1] 2.5 in. long 10-32 screw (am-1024) and affixing it to each RAMP End Bracket with [1] 10-32 nylock nut (am-1042). The spacers are always on the outside of the Lower RAMP Assembly, on the opposite face of the RAMP End Bracket from the churros. **The hole used to attach the GATE Stop will be different between the blue and red RAMPS and is always on the side with the "extra" churro.**



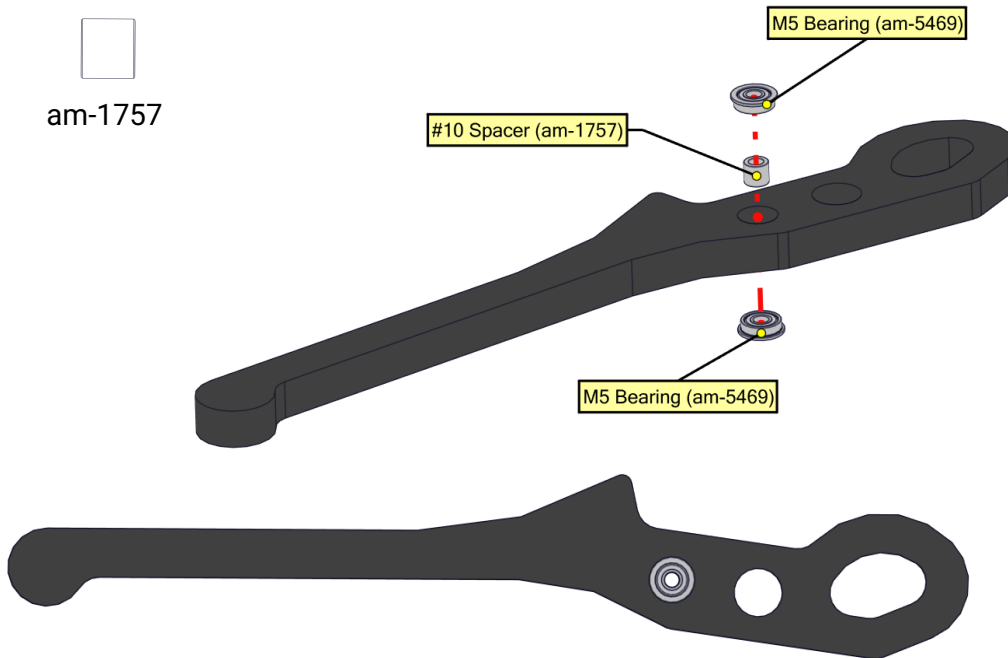
Step 6

Create [2] GATE Assemblies by inserting [2] M5 bearings (am-5469) and [1] #10 spacer (am-1757) into each of [2] GATE Arms (am-5728). Bearings should be fully inserted into the GATE Arm.

It may be useful to use the 1.5 in. long 10-32 screw (am-1014) from the next step to help keep the #10 spacer (am-1757) in the correct location during assembly.

If pressing the bearings into the plastic is difficult, during the next step when tightening the pivot screws it will be possible to ensure the bearings are both fully seated in the GATE arm.

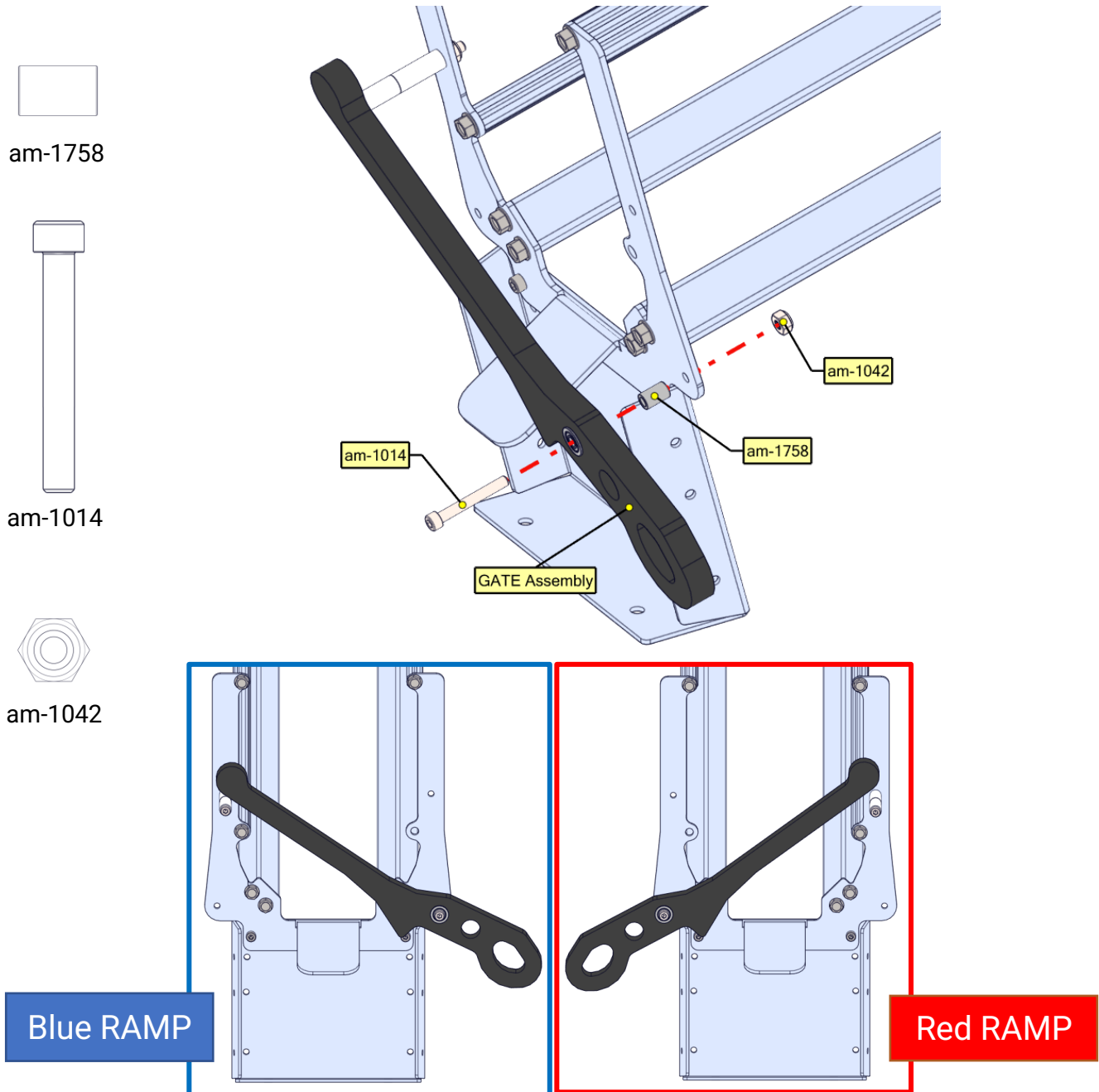

am-1757



2X

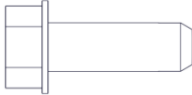
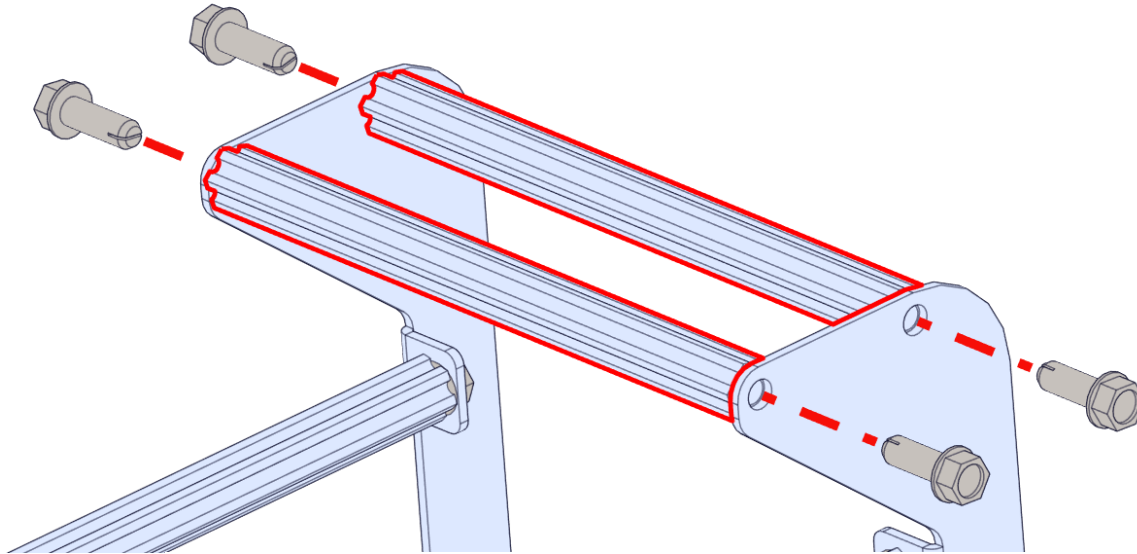
Step 7

Attach a GATE Assembly to the front of each Lower RAMP End Bracket using [1] 1.5 in. long 10-32 screw (am-1014), [1] 0.5 in. spacer (am-1758), and [1] 10-32 nylock nut (am-1042) on each Lower RAMP Assembly. Fully tighten the screws, ensure the bearings have fully seated in their GATE arm and ensure the GATE pivots smoothly. **The GATE assemblies are mirrored relative to the FIELD, the hole used to attach the GATE Assembly will be different between the blue and red Lower RAMP Assemblies.**

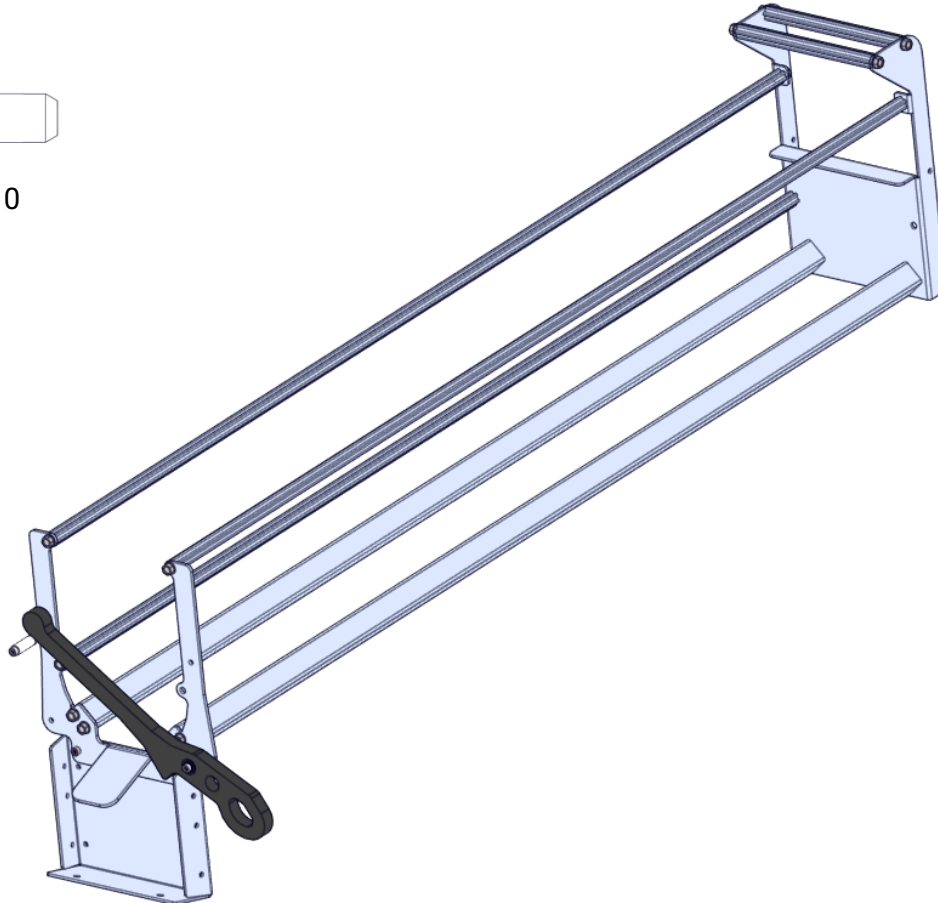


Step 8

Attach [2] 6.25 in. Hat churros (am-5724) to each Upper RAMP Small Bracket using [4] 1/4-20 Threadforming Screws (am-1310).

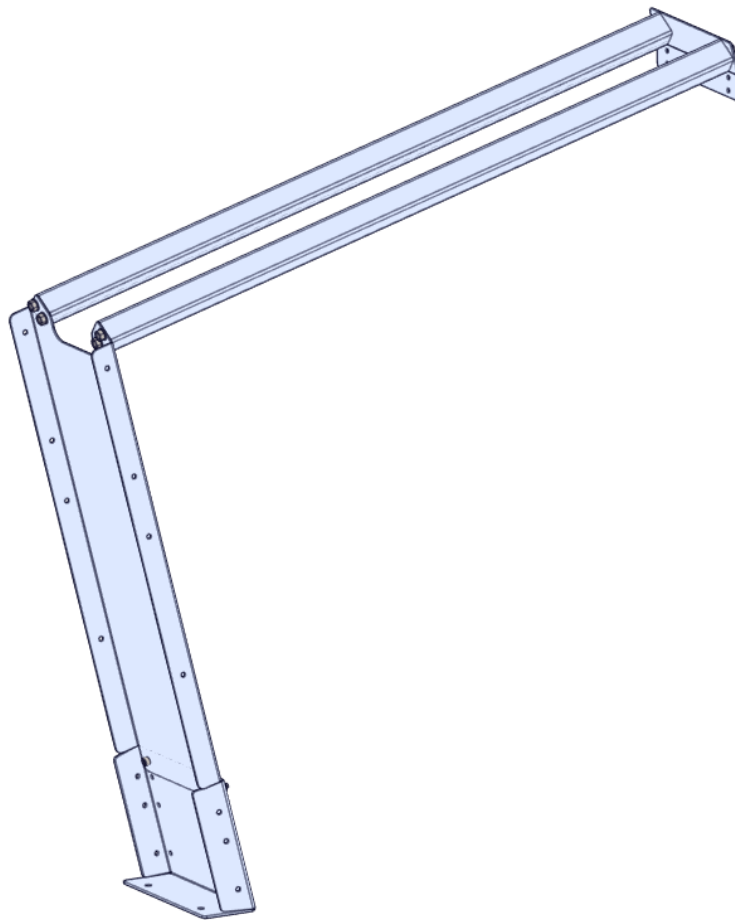


am-1310



2X

Upper RAMP Assembly



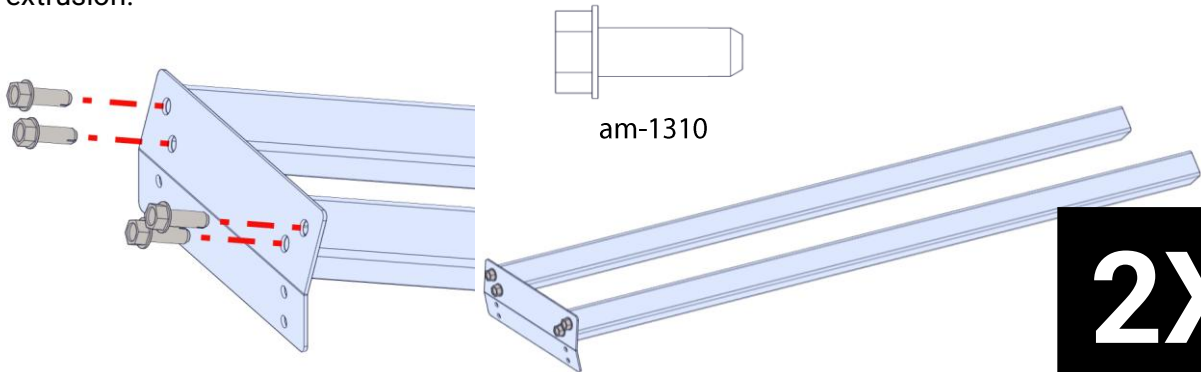
WARNING

Metal parts MAY have sharp edges. Be careful when handling them. Using gloves is recommended. Sharp edges can be deburred with a deburring tool or sandpaper.

6 Upper RAMP Assembly

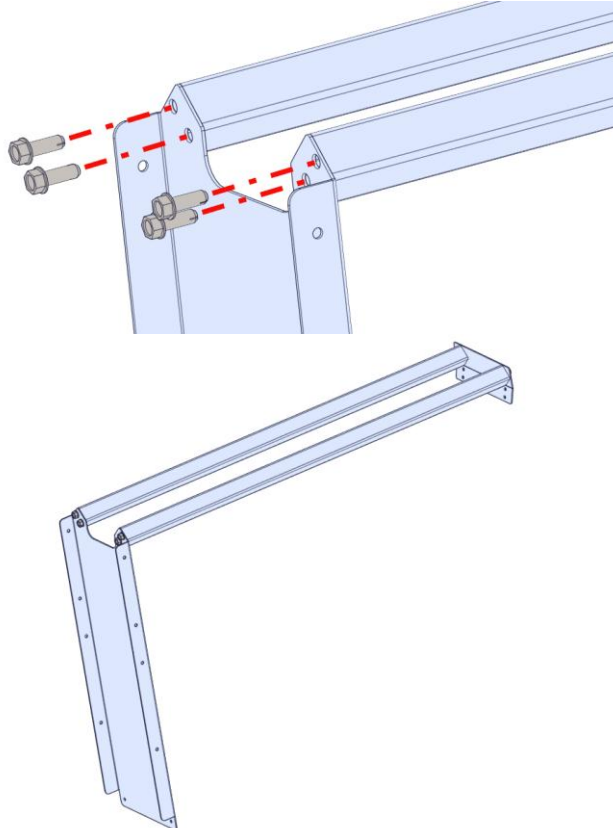
Step 1

Affix [2] 28 in. peanut extrusions (am-5725) to an Upper RAMP Mount Bracket (am-5723) using [4] 1/4-20 Threadforming Screws (am-1310). The bent portion of the bracket should be bent towards the peanut extrusion.



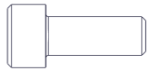
Step 2

Attach [1] Upper RAMP Large Bracket (am-5719) to the peanut extrusions on each Upper RAMP Assembly created in in Step 1 using [4] 1/4-20 Threadforming Screws (am-1310). The bends on the bracket face away from the peanut extrusion.

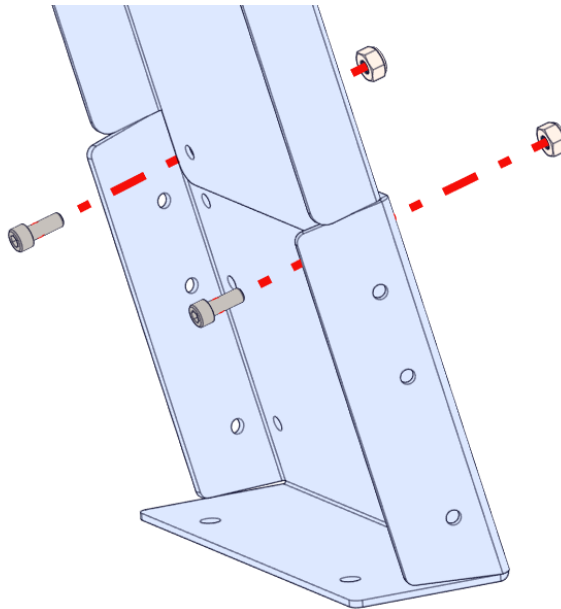


Step 3

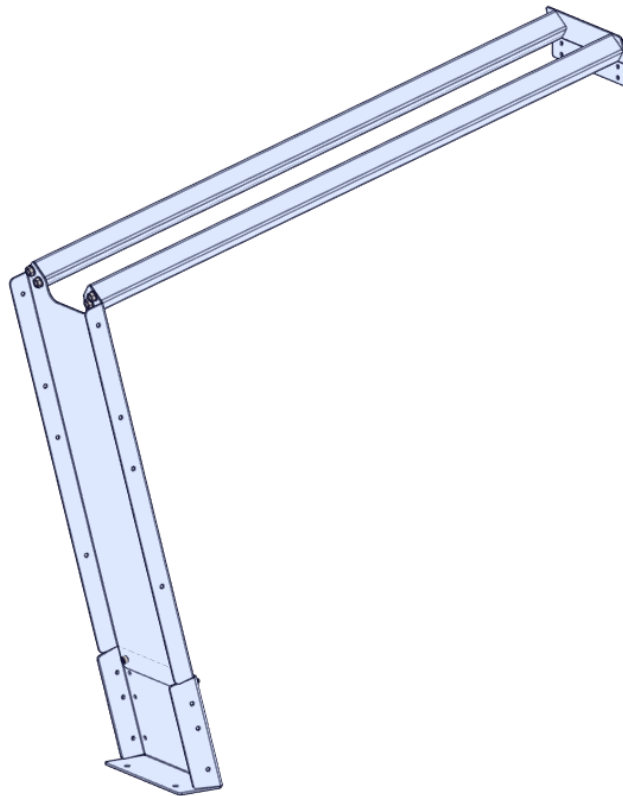
Attach [1] RAMP Support Bracket (am-5726) to each Upper RAMP Assembly using [2] 0.5 in. long 10-32 screws (am-1002) and [2] 10-32 Nylock Nuts (am-1042).



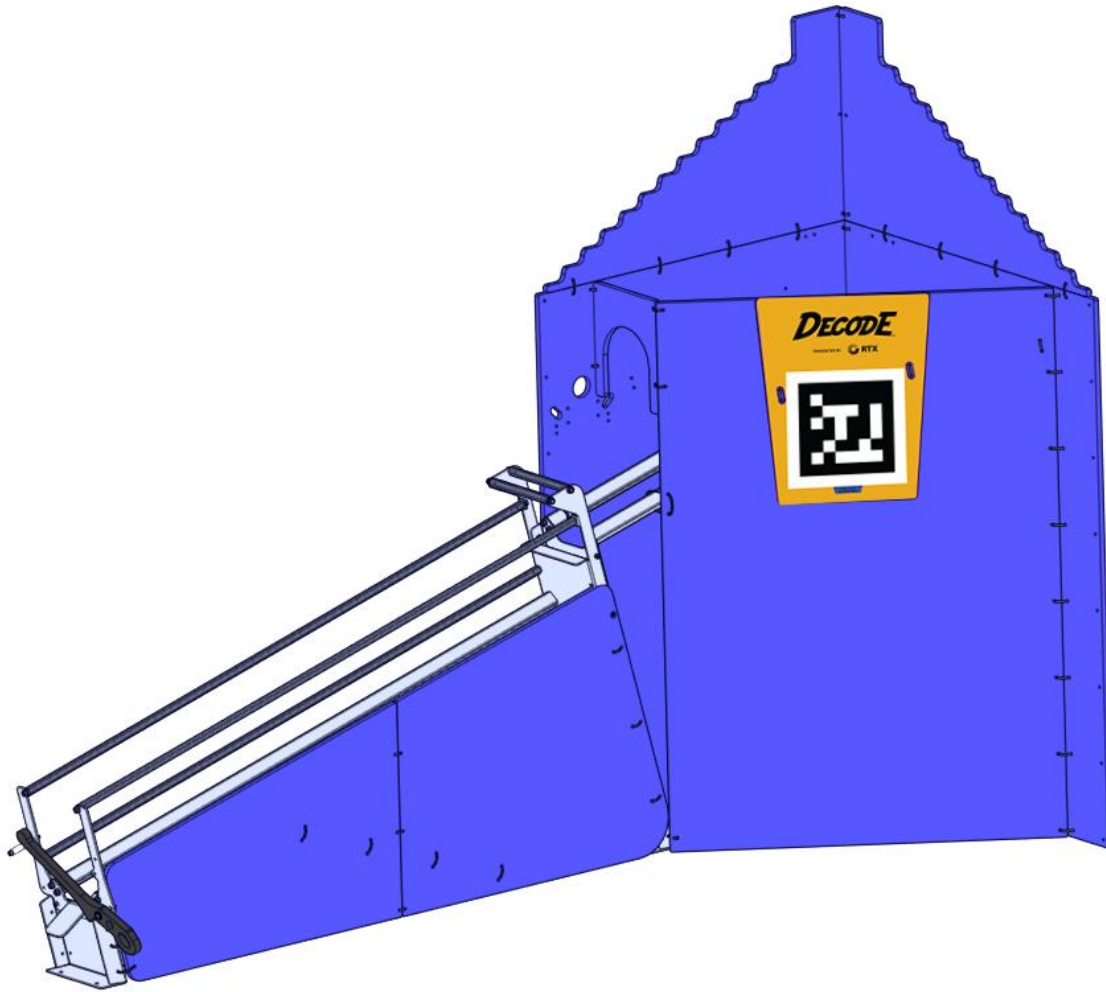
am-1002



am-1042

**2X**

GOAL Assembly



WARNING

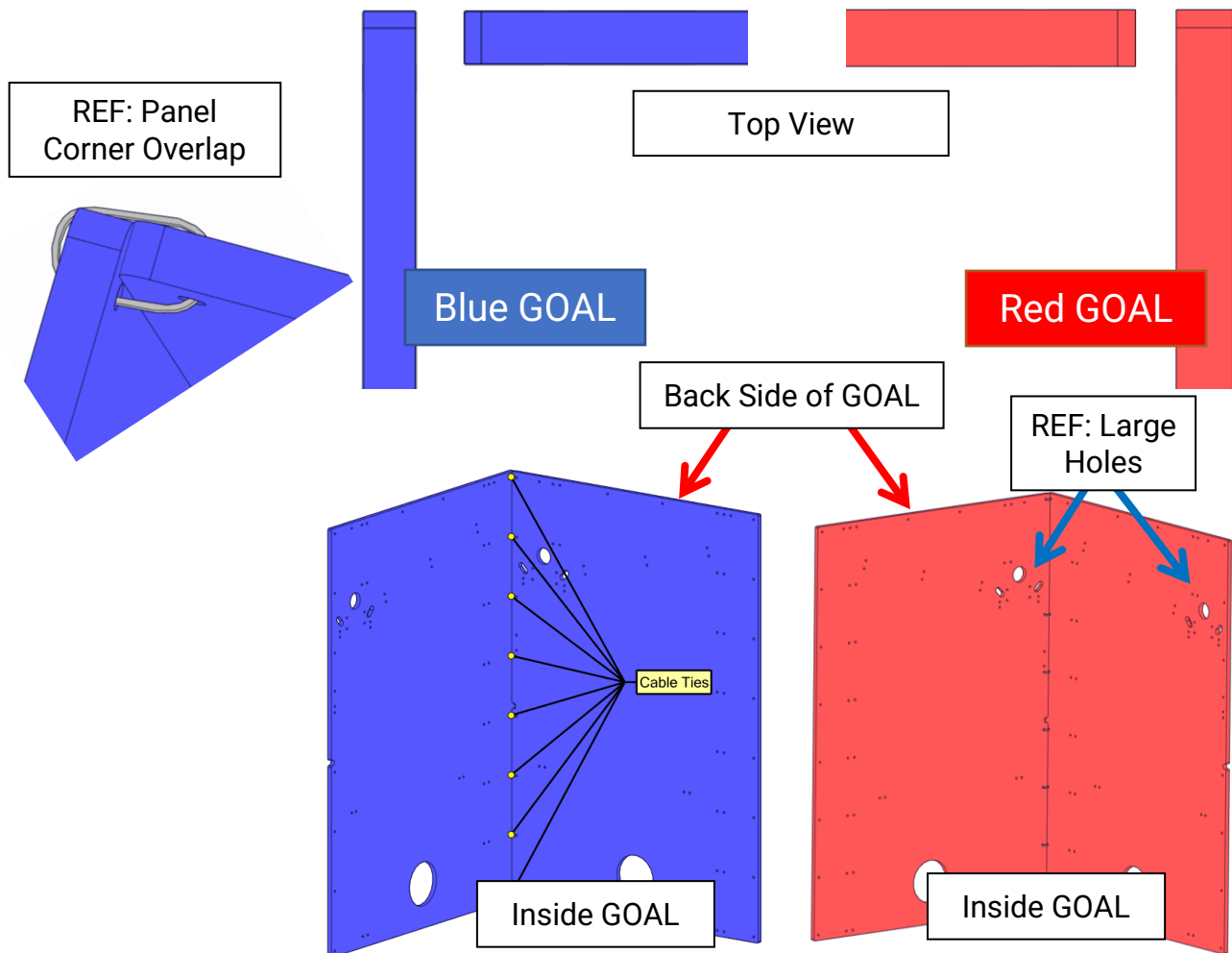
Metal parts MAY have sharp edges. Be careful when handling them. Using gloves is recommended. Sharp edges can be deburred with a deburring tool or sandpaper.

7 GOAL Assembly

Step 1

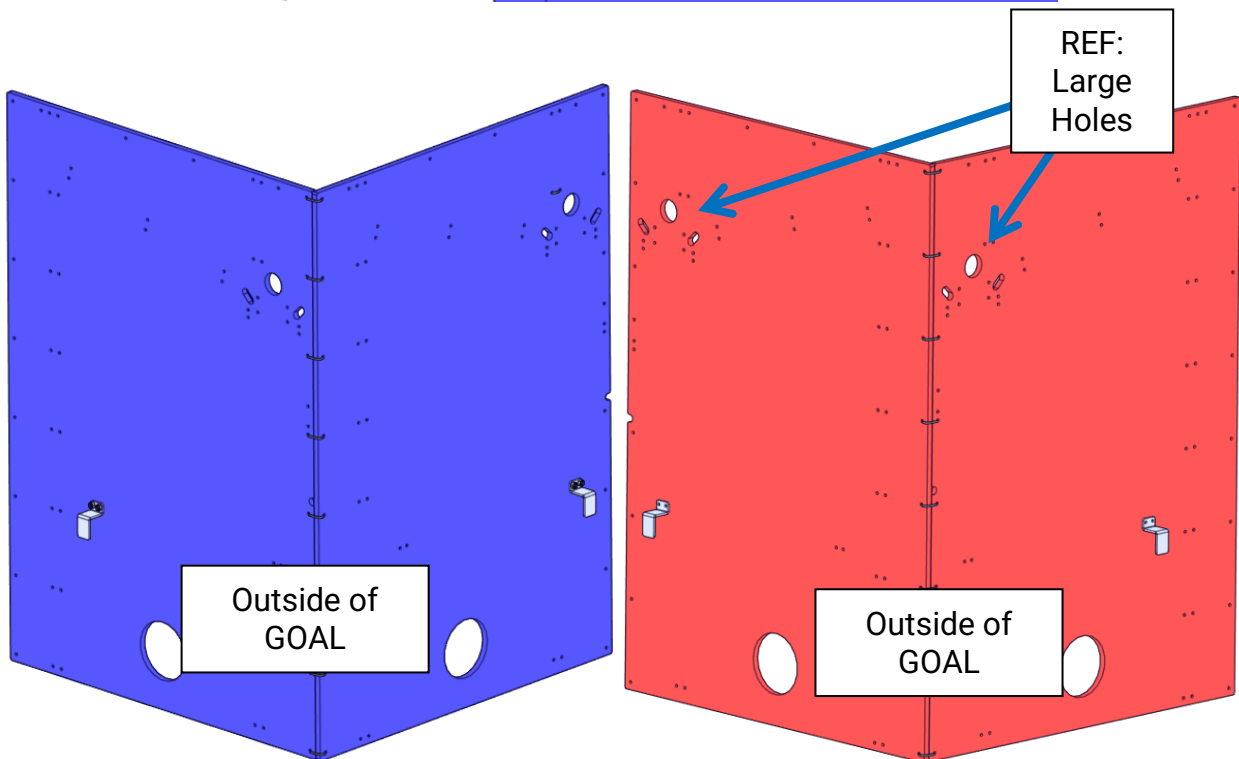
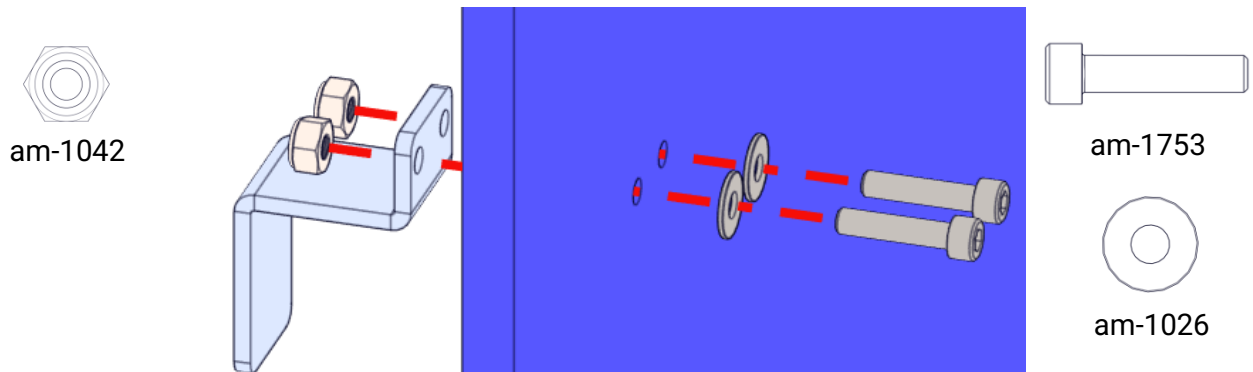
Create the rear corner of each GOAL by connecting [2] GOAL Rear Panels (am-5717) as shown using [8] cable ties (am-1552). Ensure cable tie heads are on the outside of the GOAL Assembly. Be careful to place the rear panels in the correct orientation as shown. Cable ties for this step and all steps should match the color of the GOAL being assembled – blue cable ties for the blue GOAL and red cable ties for the red GOAL.

NOTE: During initial assembly, leave cable ties loose. Do not tighten cable ties or trim cable tie tails until GOAL assembly is complete. Also, pay close attention to the placement of cable tie heads during installation.



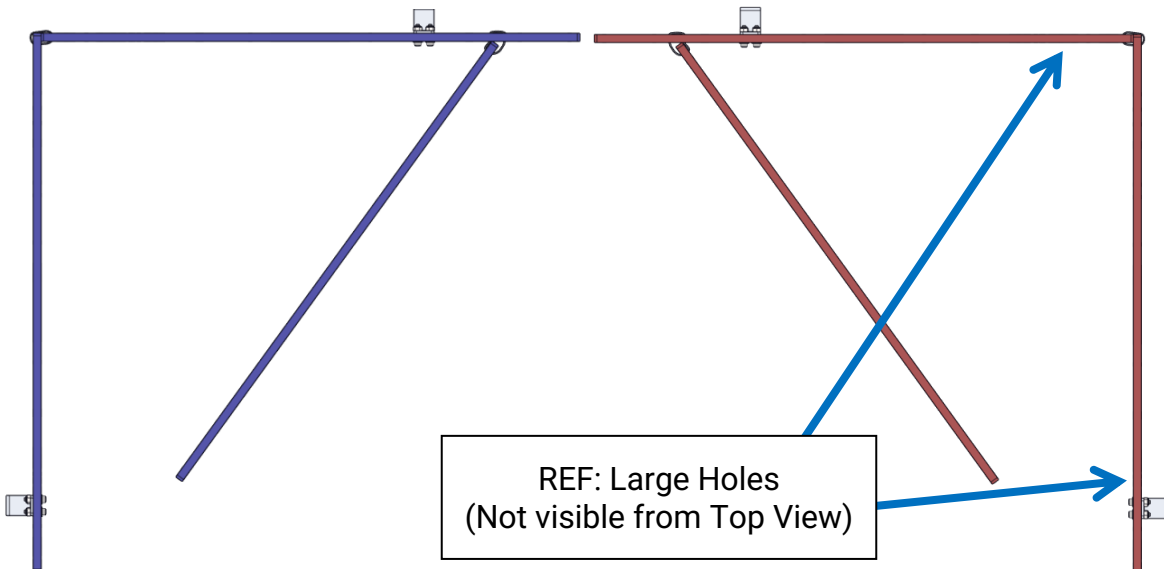
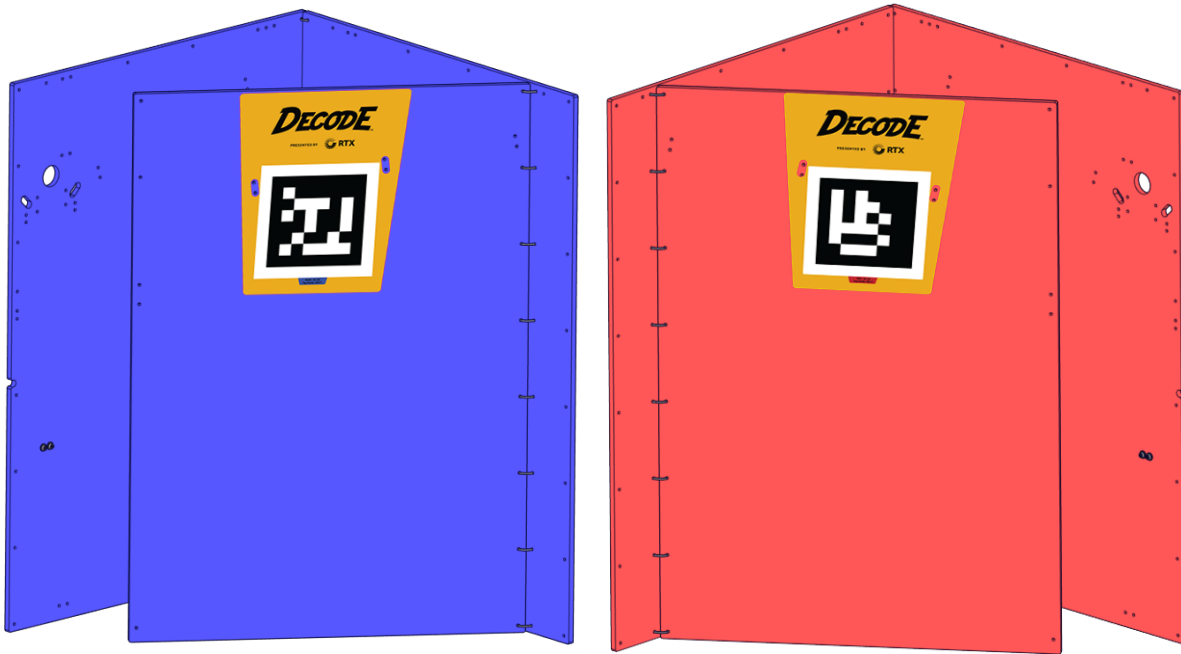
Step 2

Attach [2] GOAL Border Brackets (am-5722) in the locations shown on the outside of each GOAL Assembly using [4] 0.875" 10-32 screws (am-1753), [4] #10 washers (am-1026) and [4] 10-32 nylock nuts (am-1042). The washers must be installed such that they touch the plastic, not the bracket.
Fully Tighten each screw, but do not crush the plastic!



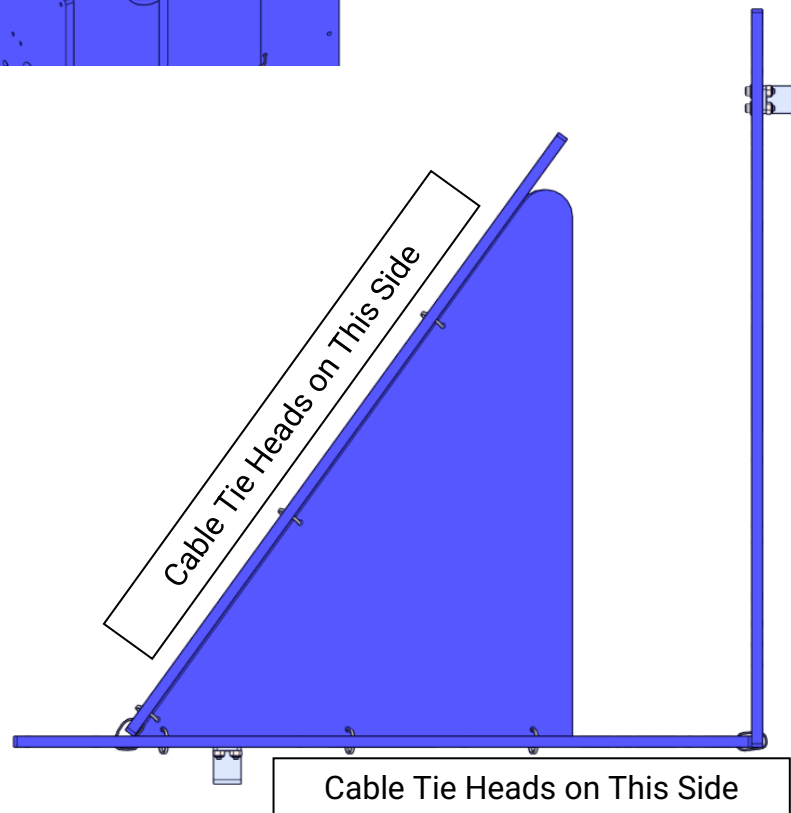
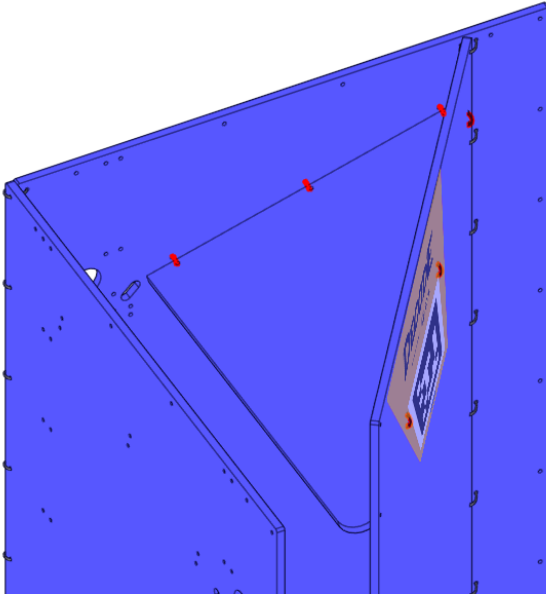
Step 3

Create the front face of each GOAL Assembly by connecting [1] GOAL Front Panel (am-5716) as shown using [8] cable ties (am-1552). Ensure cable tie heads are on the outside of the GOAL Assembly such that they are adjacent to the FIELD perimeter (i.e., not inside the FIELD). **Leave cable ties loose for now.**



Step 4

Attach [1] Internal RAMP (am-5721) to each GOAL Assembly as shown using [6] cable ties (am-1552). Ensure cable tie heads are on the outside of the GOAL Assembly. Leave cable ties loose so the Rear Panels can rotate relative to each other in the next step.



2X

Step 5

Attach both Upper RAMP Assemblies to the [2] GOAL Assemblies in the locations shown using [4] 0.875 in. long 10-32 screws (am-1753), [4] #10 washers (am-1026), and [4] 10-32 nylock nuts (am-1042) on each GOAL Assembly. The washers must touch the plastic, not the sheet metal component of the assembly. **Fully Tighten each screw, but do not crush the plastic!**



am-1753

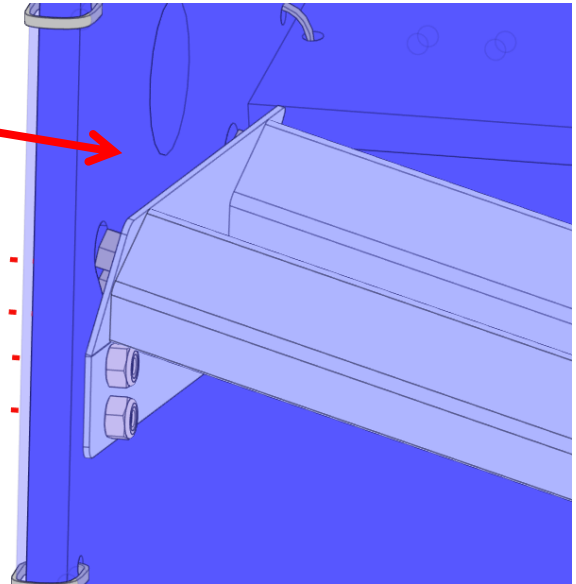
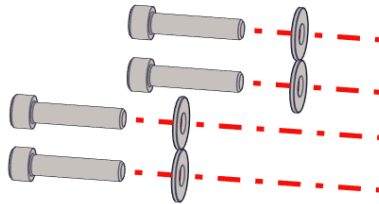


am-1026

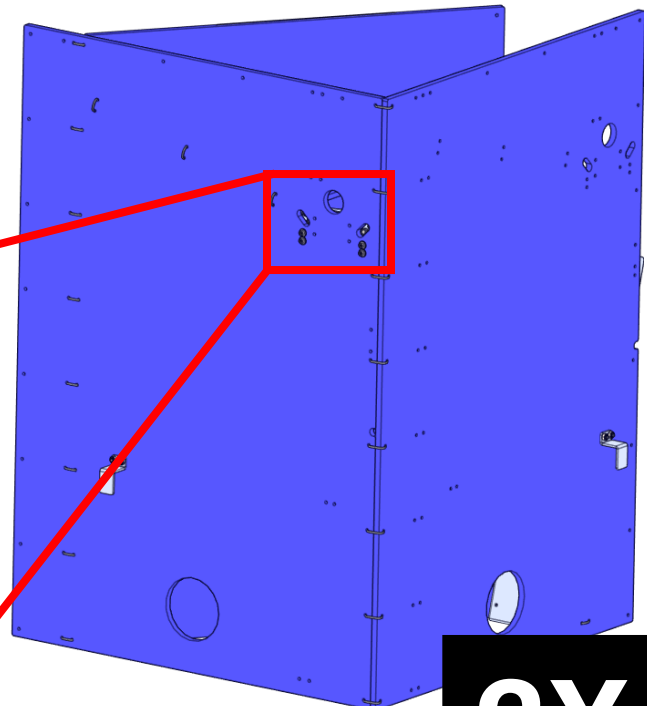
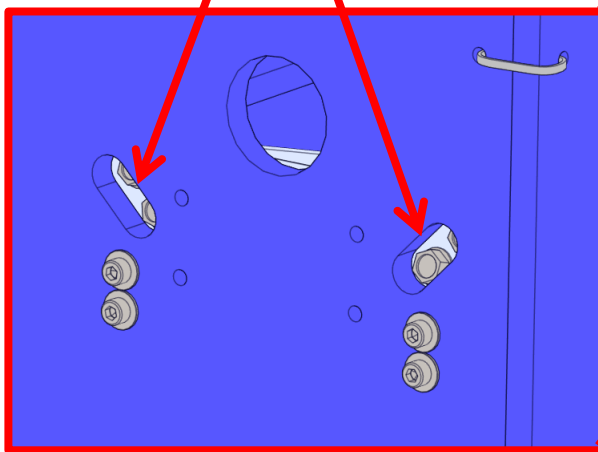


am-1042

Side Panel
Hidden for
Clarity



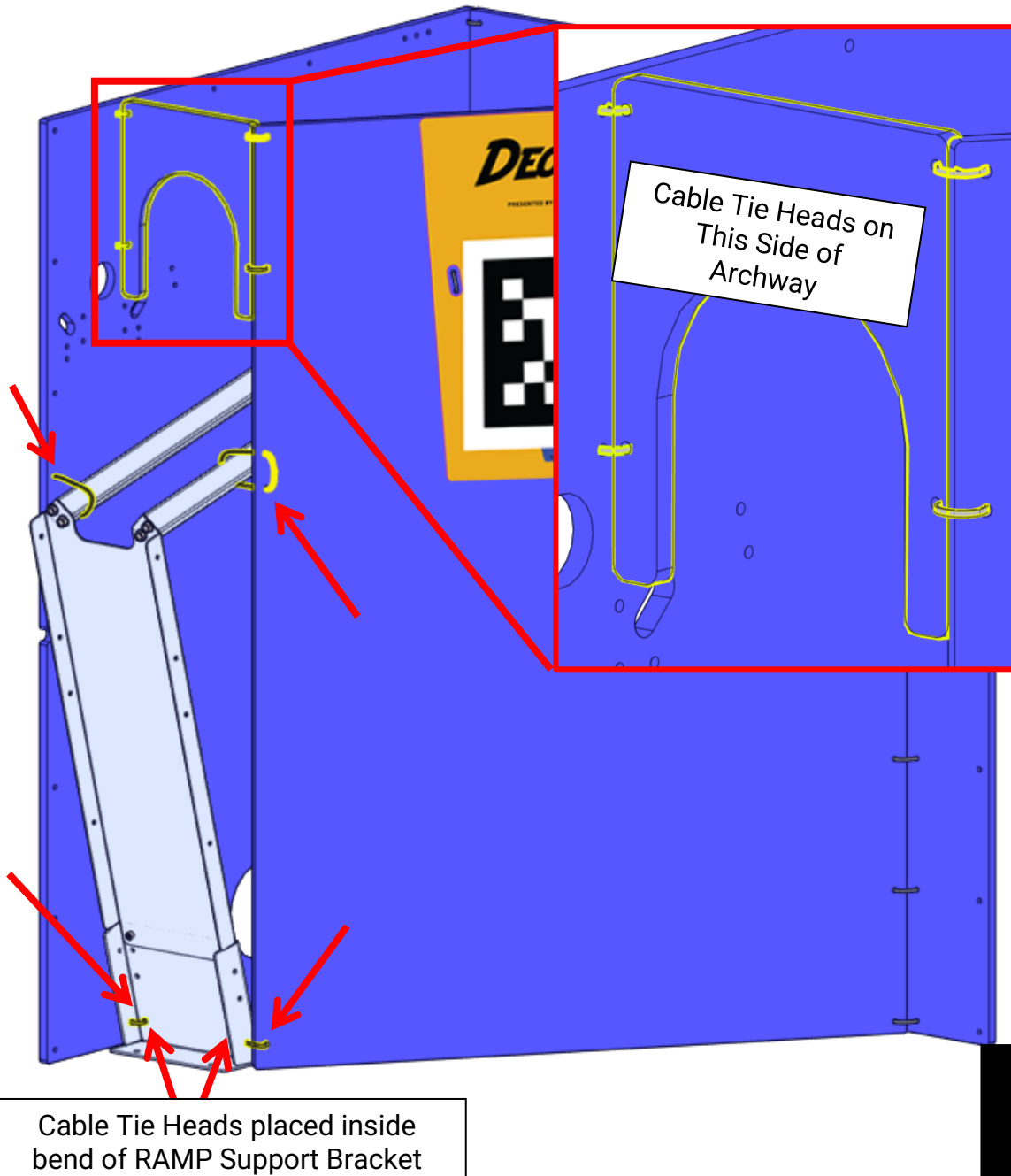
Threadforming screws on the Upper RAMP assembly protrude through clearance obounds. They are not installed in this panel.



2X

Step 6

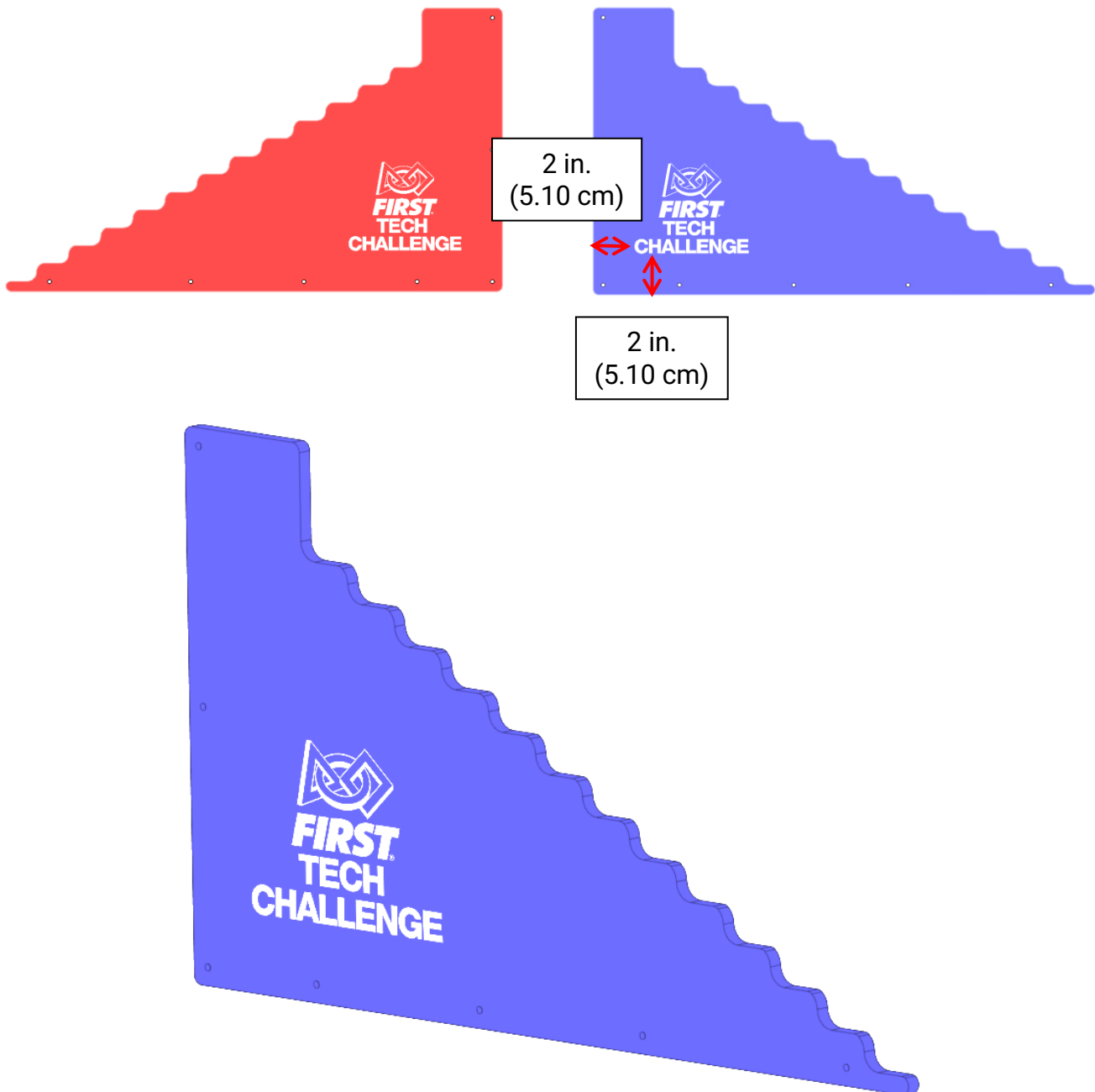
Attach the Upper RAMP Assembly and [1] GOAL Archway (am-5730) to the Front Panel and Rear Panel of each GOAL Assembly using [8] cable ties (am-1552), as shown. Ensure cable tie heads are on the outside (i.e., not on the side where ARTIFACTS will be scored) of the assembly. **Tighten all cable ties on both GOAL Assemblies at this time.**



2X

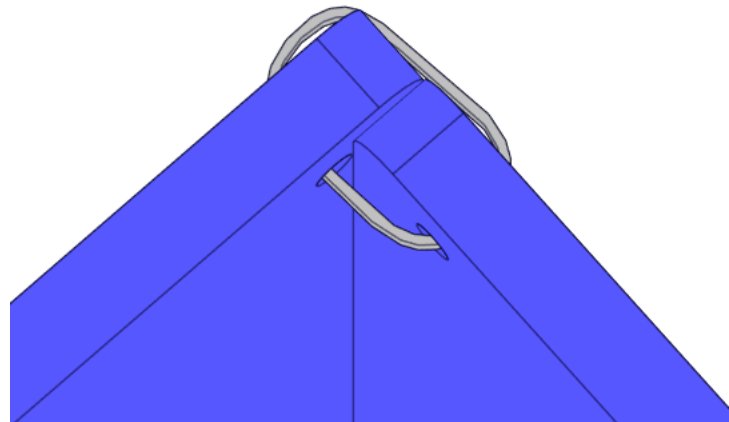
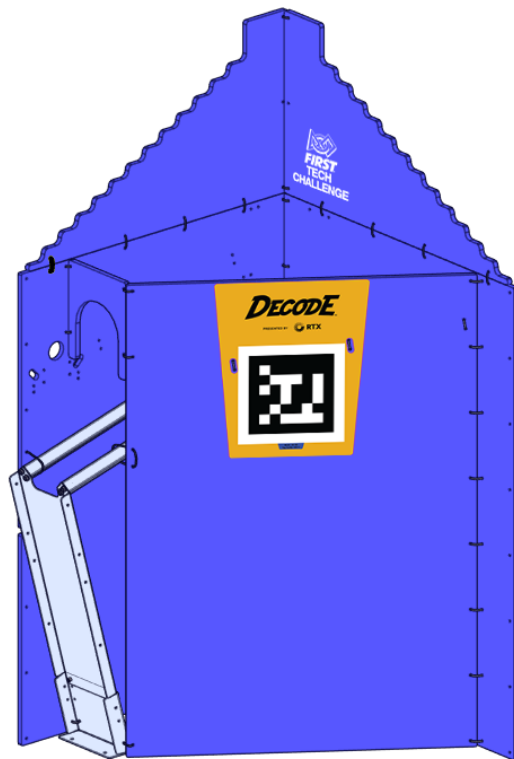
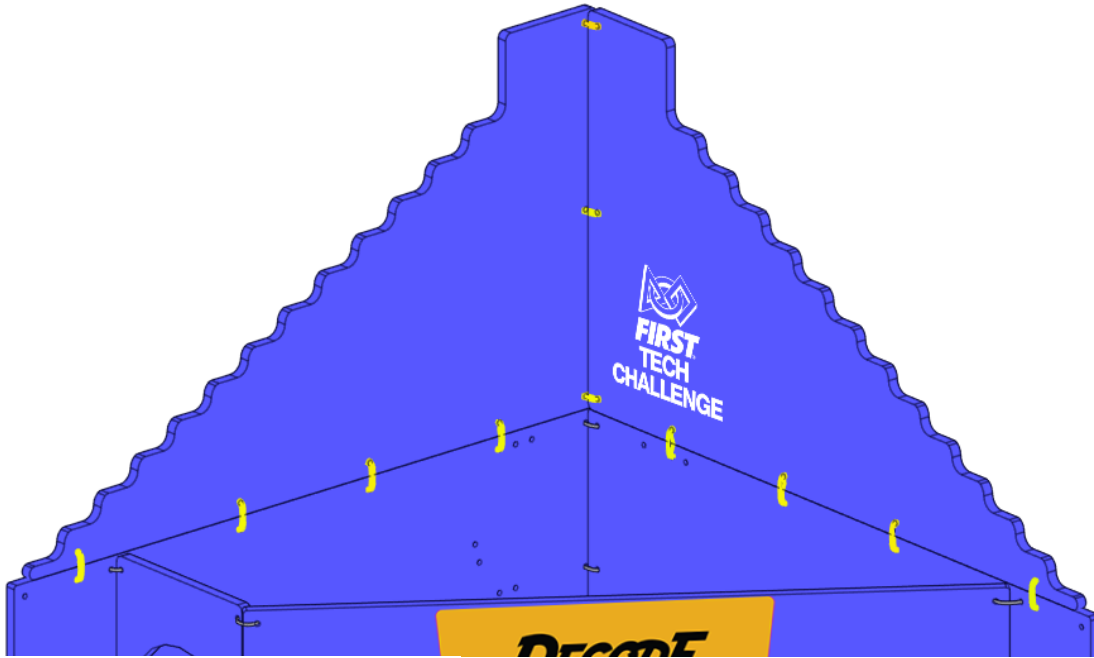
Step 7

Apply [1] FIRST Tech Challenge Sticker (am-5708) to [1] of each color GOAL Backboard Panels (am-5718) approximately 2 in. (5.10 cm) from each edge, as shown.



Step 8

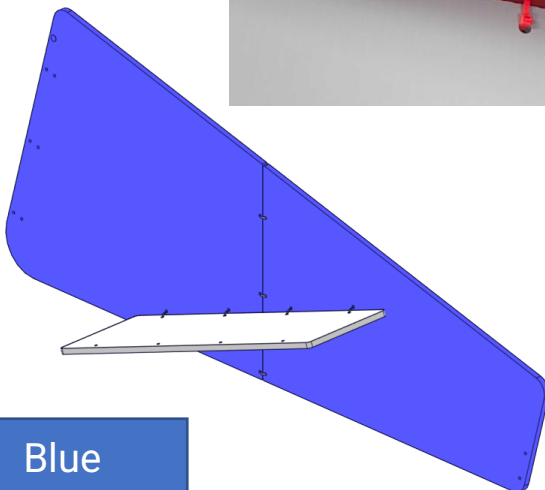
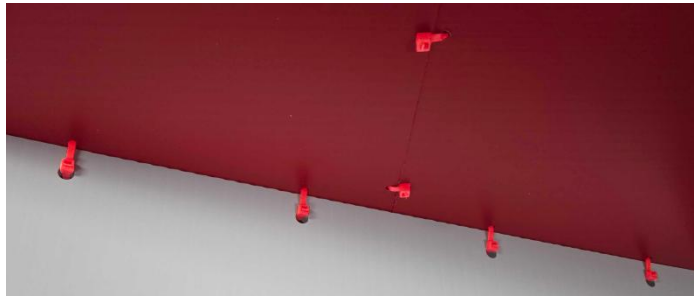
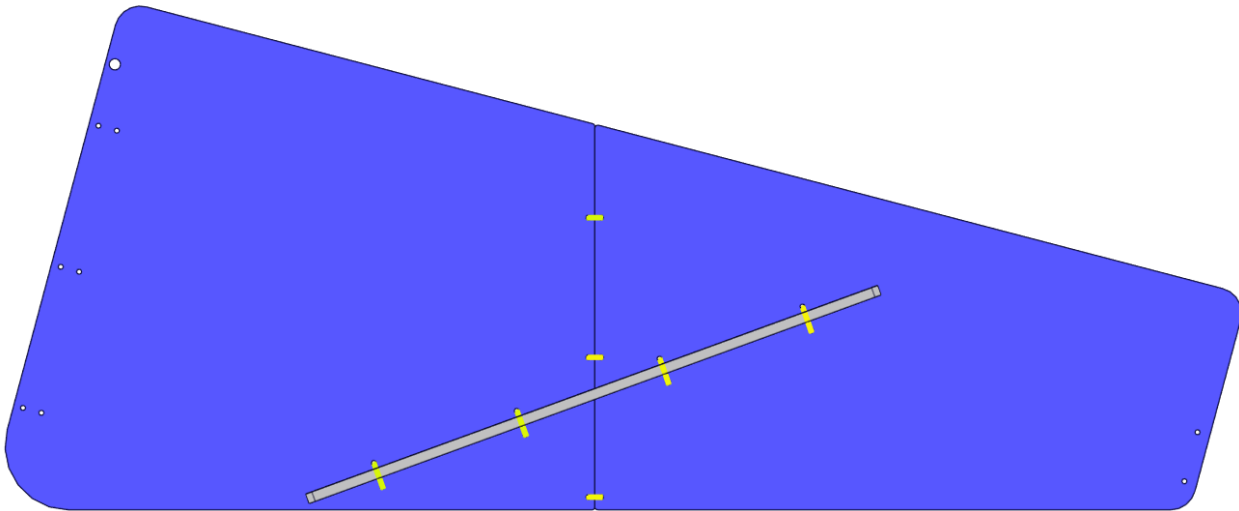
Attach [2] GOAL Backboard Panels (am-5718) as shown to the GOAL Assembly using [11] cable ties (am-1552). Ensure cable tie heads are on the OUTSIDE of the assembly. **Tighten all cable ties.**



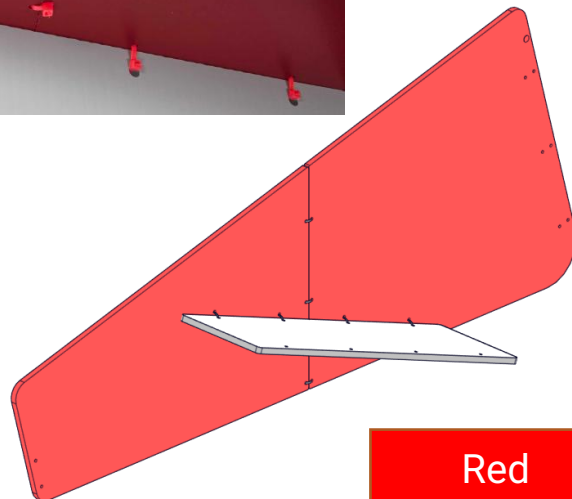
2X

Step 9

Create a Blocker Panel Assembly by connecting [1] Lower RAMP Blocker Small Section (am-5735), [1] Lower RAMP Blocker Large Section (am-5731), and [1] RAMP Support (am-5737) using [7] cable ties (am-1552). All cable tie heads should be on the side of the panel with the RAMP Support (the white component). The white component will attach to a different face on the blue GOAL assembly than on the red GOAL assembly, as shown.

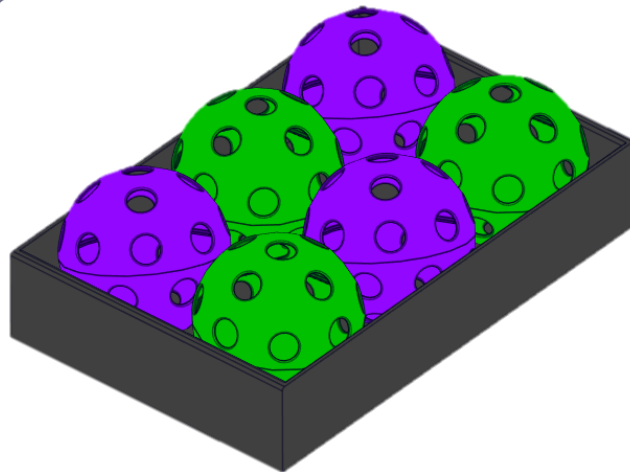


Blue



Red

OBELISK Assembly & ARTIFACT Tray Assembly



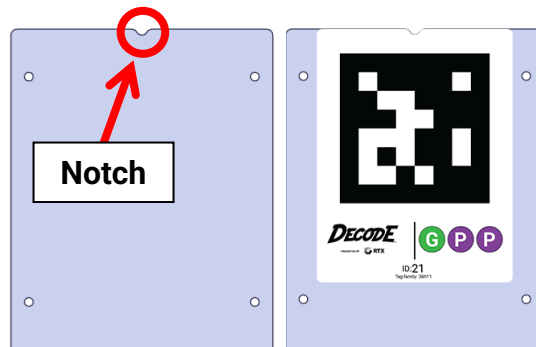
8 OBELISK Assembly & ARTIFACT Tray Assembly

Step 1

To each OBELISK Plate (am-5714), apply [1] AprilTag Sticker (IDs 21, 22, or 23). Try to make sure the sticker is applied at the top edge of the panel, centered on the panel (using the notch as a reference) and is applied without bubbles/wrinkles.

To help with correct application: leave the backing on the sticker and attach it in the correct location on the panel with small pieces of tape. Slowly peel the small section of backing material off the sticker and squeegee any air-bubbles out from under the sticker. Once in place, slowly peel the remaining backing off while squeegeeing out bubbles, and completely adhere the sticker.

TOP TIP for Happy Refs: To assist in rotating the OBELISK to the correct side during FIELD randomization, it is recommended that the back of each panel is labeled with the MOTIF code shown on the front face (i.e., 21 - GPP, 22 - PGP, 23 - PPG). This can be done using a marker or label maker.

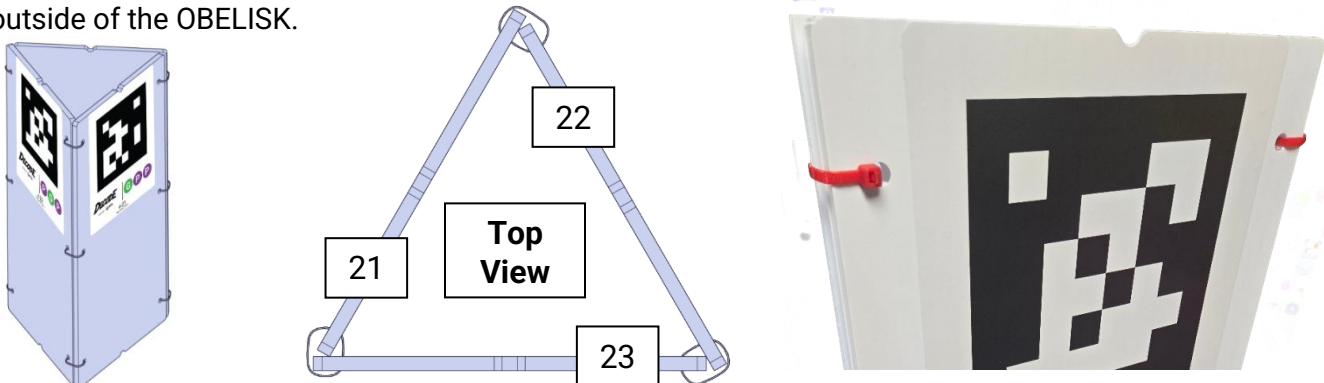


3X

Step 2

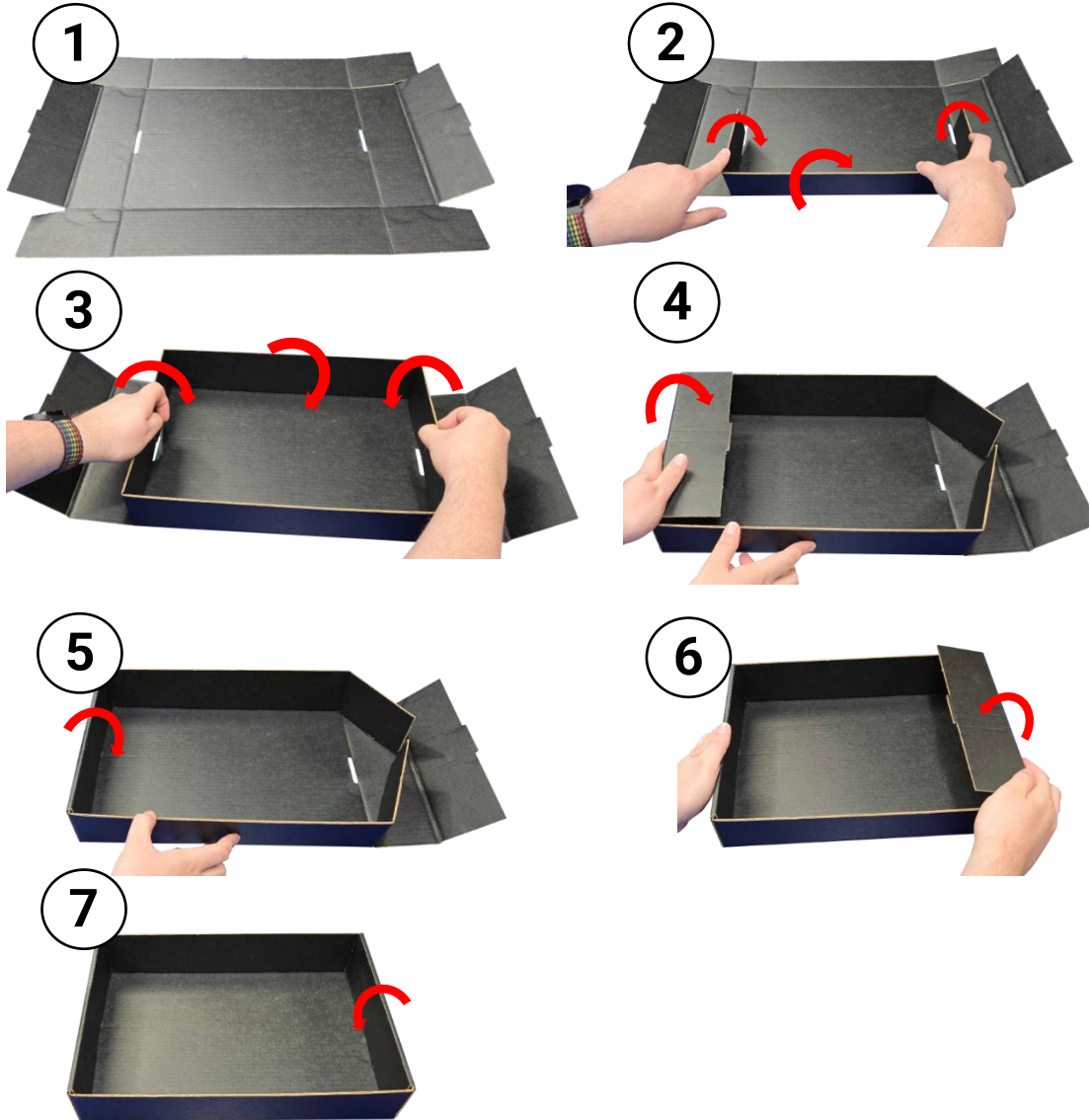
Using [9] cable ties of any color (am-1552), assemble the OBELISK as shown. Pay close attention to the geometry of how the corners overlap. When assembling the OBELISK, place the panels such that when viewed from the top the AprilTags are clockwise in sequential order "21-22-23", as shown.

Ensure when assembled, all the AprilTag stickers are at the top of the OBELISK Assembly, and on the outside of the OBELISK.



Step 3

Fold the [2] ARTIFACT Trays according to the instructions below.



2X

Revision History

Revision	Date	Description
V1	9/5/2025	Initial Release