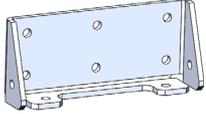
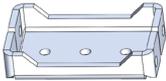


# Bumper Hardware Assembly Guide



Included in this year's Drive Chassis Base Kit are brackets and hardware to build a red and blue set of bumpers and securely attach them to the AM14U4 frame. These brackets can be placed in a variety of different places along the frame rail to allow for partial or full bumper coverage.

Bumper Hardware Included Parts			
Component	Part Number	QTY	Part Photo
<b>Front/Corner Bumper Bracket</b>	<a href="#">am-3961</a>	8	
<b>Side Mount Bumper Bracket</b>	<a href="#">am-3962</a>	8	
AM14U4 – Bumper Hardware Kit – AM-3966h			
<b>10-32 RHS x 3.750"</b>	<a href="#">am-1502</a>	12	
<b>10-32 Wing Nut</b>	<a href="#">am-1483</a>	25	
<b>#8 Phillips Flat Head Wood Screw</b>	<a href="#">am-1387</a>	50	
<b>Note:</b> Additional items are needed for bumper assembly including pool noodles, robust red and blue fabric, industrial staples. For supplies, visit <b>AndyMark.com</b> .			



**The Front/Corner Bracket** is designed to sit on top of the AM14U4 end plate and provide additional backing for front and back impacts. These brackets permanently attach to the bumper with included wood screws. AndyMark recommends that these brackets be attached at the end of any bumper segments and behind any long lengths for optimal strength.



**The Side Mount Bracket** is designed to sit between the top and bottom flange of the AM14U4 outer plate. Side cutouts on the bracket allow for it to fit over hardware. These brackets should be spaced evenly along the sides of the robot and at the end of any bumper segments.

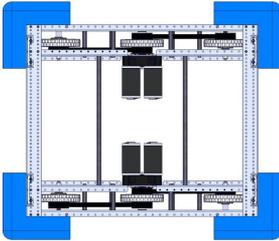


**Long screws and wingnuts** are also included. This hardware allows for the quick bumper segment removal without the use of hand tools. This hardware can be swapped out for your own hardware such as hex head screws and nuts, or quick release pins.

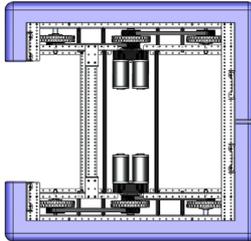
## AM14U4 Bumper Attachment Suggested Method

**NOTE: Additional tools and materials are needed to complete a bumper set**

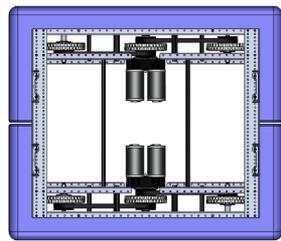
**Step 1:** Plan out which edges of the drive base frame perimeter will be covered with bumpers. You may choose to accommodate for a mechanism or opening in your frame. Ensure this design **complies with all bumper rules** found in this year's game manual. Brackets should be attached to the frame in the corners, at the ends of bumper segments, and behind any long bumper lengths.



**Corner Bumpers**

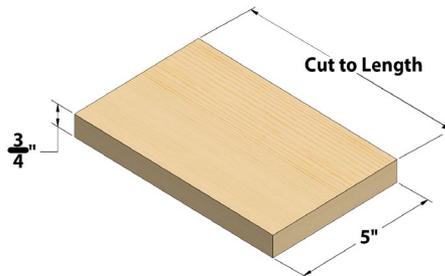


**Frame Opening**



**Full wrap – Two C-Segments**

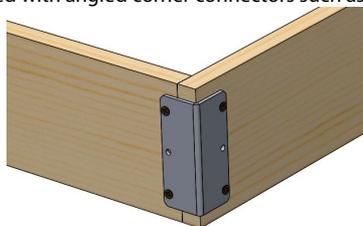
**Step 2:** Cut  $\frac{3}{4}$ " wood into bumper planks that are 5" tall and to desired lengths ensuring it meets the minimum length according to the current rule manual.



For the corner bumper configuration, 8 planks are needed for each red set and blue set of bumpers. Longer sections are needed to get more coverage on the robot.

**Each section should measure an integer number of inches to align with chassis frame holes.**

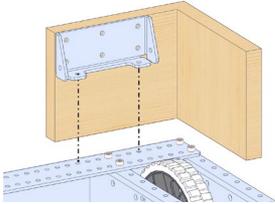
**Step 3:** Bumpers can either be made in straight sections or in sections that wrap around corners. To ensure that bumpers designed to wrap around corners are rigid, it is recommended that the corner edge be strengthened with angled corner connectors such as am-3233 (not included)



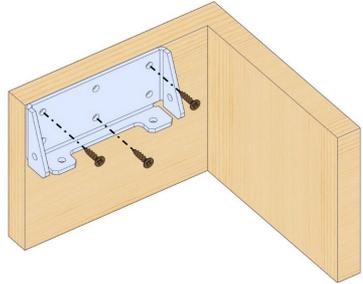
**Step 4:** Use either a single plank or a corner section of wood planks to align the Front Brackets (am-3961) on the End Plates.

If building corner bumpers, the Front Brackets should be placed at edges of the front wood sections for support.

For 2020, when using 6" wheels, the top edge of the wood planks can be aligned with the top of the Front Brackets.

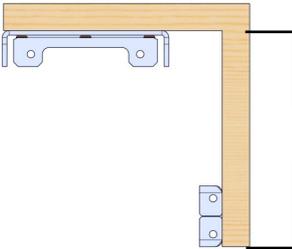


**Step 5:** Install three #8 wood screws (am-1387) into each Front Bracket as shown below.



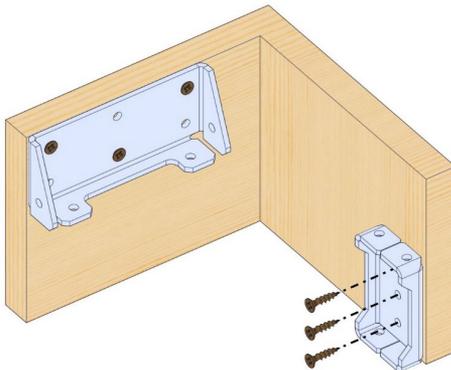
**Step 6:** For corner bumpers, align Side Bracket (am-3962) to the edge of the bumper plank.

For longer length bumpers, measure and mark a whole number of inches from the inside edge of the front wood and align the far edge of the side bracket along that mark.



X.00" In whole number increments at the end of a segment or evenly spaced along the side.

**Step 7:** For 2020 when using 6" wheels, the bottom edge of the wood planks can be aligned with the bottom of the Side Brackets. Once the bracket is in place, install three #8 wood screws (am-1387) into each Side Bracket as shown below.



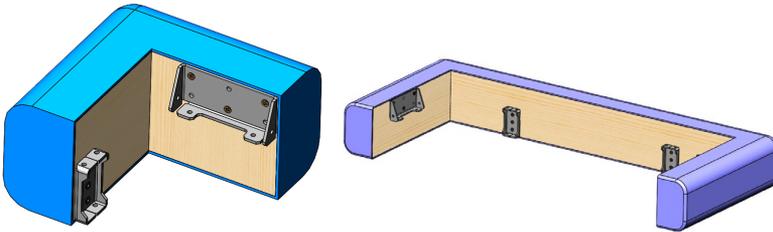
**Step 8:** Cut noodles to a length that matches the wood planks. Cut fabric large enough to wrap around noodles and wood with enough extra for stapling. If adding **team numbers onto fabric it may be useful to do this before adding to bumper segments.**



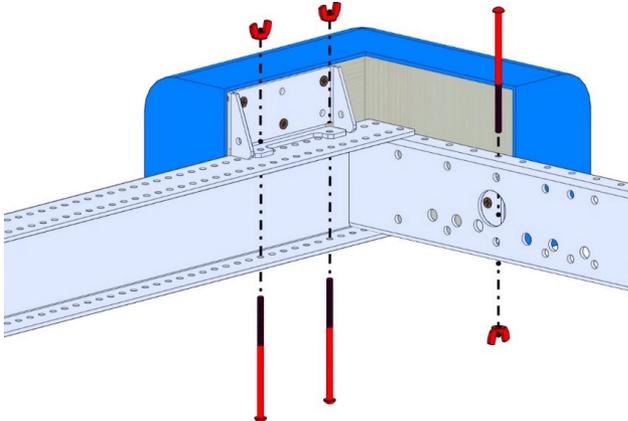
**Step 9:** Wrap fabric tightly around noodles. No noodles should be showing after wrapping. Staple fabric evenly along edge of bumper and trim any extra fabric. You will need to access the holes and hardware to attach bumpers frequently.



The finished segments should look similar to the pictures below:



**Step 10:** Attach bumpers as shown with 10-32 x 3.75" round head screws (am-1502) and 10-32 wing nuts. (am-1387) for easy installation and removal.



**Note:** On Side Brackets, the wing nuts must be installed on the bottom of the chassis in order to clear the bumper wood. Alternatively, #10-32 nuts can be used.