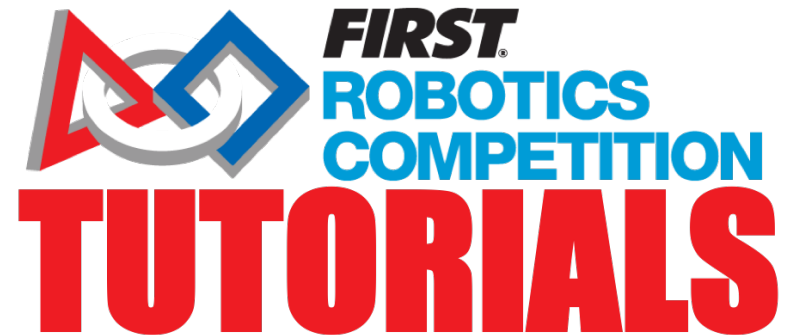


Bumper Basics

TEAM 8027



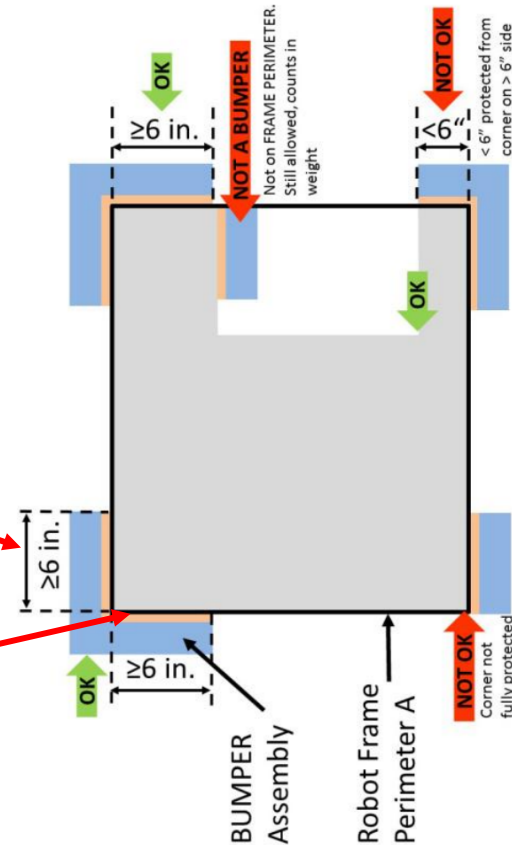
The role of bumpers in FRC

- Depending upon your match, you might be either on the Red Alliance or the Blue Alliance
- Based on the alliance, you have to have a matching bumper color
- If your bumper falls off or changes colors in the middle of a match, the FTA can disconnect you from the field and not let you play
- Since you keep your team number forever and always are either red or blue, your bumpers are reusable in future years.

Match	Teams			Score
Match 8 9:56A	6936	6927	8027	--
	8289	128	5667	
Match 18 11:09A	554	4467	4611	
	144	8027	5667	--
Match 24 11:51A	1511	6181	4521	
	8027	706	4283	--
Match 33 1:56P	1014	3173	3193	
	8027	1317	8289	--
Match 44 3:13P	8027	3777	4991	--
	2783	677	2081	
Match 51 4:02P	1787	5413	4269	
	1038	8027	4521	--
Match 67 9:07A	4284	8027	1014	--
	4991	4145	3201	
Match 80 10:38A	4930	2603	4027	
	3201	7434	8027	--
Match 85 11:13A	379	3504	8027	--
	5811	2252	1507	

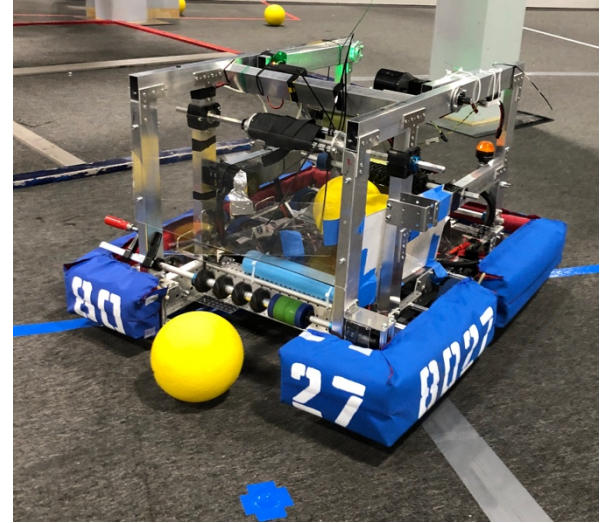
Bumper Rules

- Read the Bumper Rules in Section 9.5 Carefully
 - <https://firstfrc.blob.core.windows.net/frc2020/Manual/2020FRCGameSeasonManual.pdf>
- Some key rules:
 - At least 6 in (~16 cm) of bumper must be placed on each side of each outside corner
 - Be backed by $\frac{3}{4}$ in thick (~19mm) by 5 in \pm $\frac{1}{2}$ in. (~127 mm \pm 12.7 mm) tall plywood
 - Bumpers should not be taller than 7.5 inches from the floor



Bumper rules, cont.

- Bumpers need to be very secure – should not fall off even if you bump into the field, field elements or run into an aggressive robot playing defense.
- *But, bumpers need to be able to come off and on for inspection*



Tips for switching bumpers

- *Bumpers need to be switched out easily*
- According to the rules, bumpers should be able to be installed or removed by two people in fewer than five minutes.
- If possible, get some help to make reversible bumper covers. That way, all you have to do is flip them to change the color. Some teams use snaps, some teams use Velcro. 8027 uses surgical tubing as elastic to hold the fabric in place.
- RoboPromo sells reversible bumpers <https://www.robopromo.com/>
- **[Rookie Tip]** Even if you have flippable bumper covers, remember that you need to be able to take them off and put them back on for Inspection

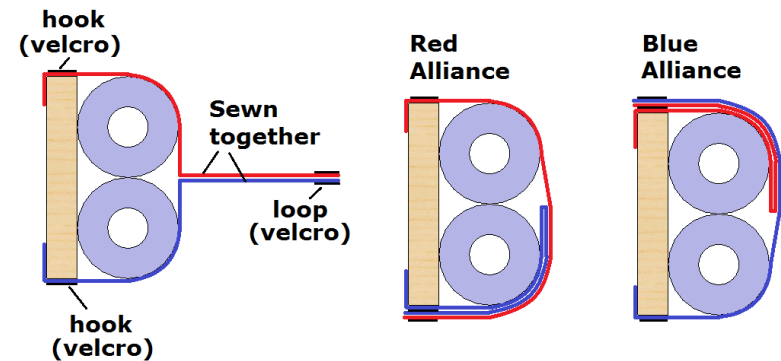


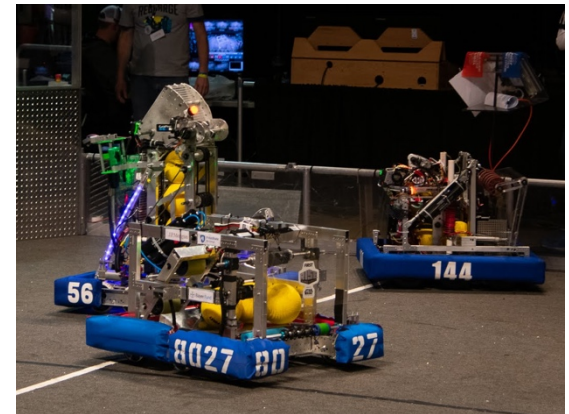
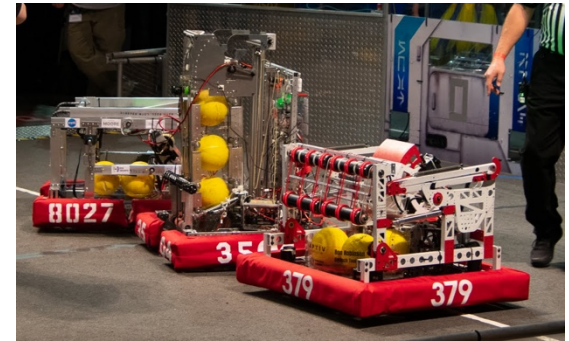
Image Source: Grabcad

Bumper Materials

- Common materials used by teams include the following:
 - Cordura – this is most common and provided to teams in the Kit of Parts for rookies
 - Sailcloth – Teams use this material because it has less friction. Many teams use this in Infinite Recharge as the Power Cells (and other robots) glide off.
 - Vinyl – Some teams opt for vinyl cloth that is more durable and has less friction than cordura

Bumper Numbers

- You do need to add numbers to your bumpers to all the sides. You are allow to split up long numbers
- The rules state: at least 4 in. (~11 cm) high, at least ½ in. (~13 mm) in stroke width, and either white in color or outlined in white [See rules for more details]
- Teams apply numbers to their bumpers in different ways:
 - Iron-on numbers – RoboPromo sells them <https://www.robopromo.com/>
 - Hand painted – use stencils and white fabric paint. You will need to apply several layers
 - Silk Screen – you probably need to ask a professional for help here.
 - Stitch on fabric numbers – Less common, but you do see some teams with stitched numbers



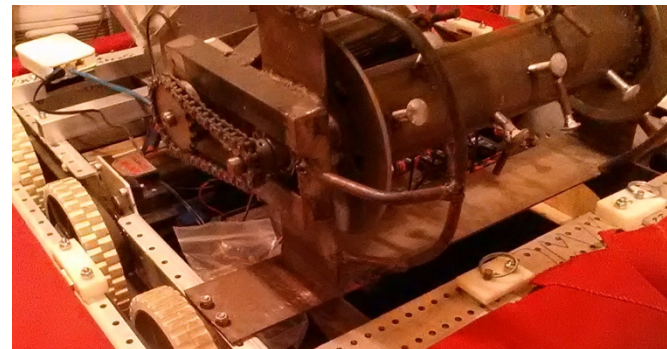
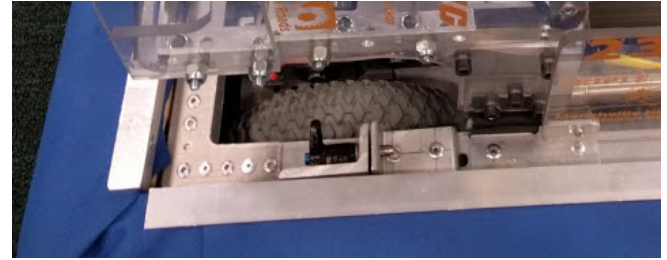
Bumper Mounting

- There are many ways to attach bumpers
- The hardware provided to rookies in the Kit of Parts can be challenging
- Other common attachment mechanisms include:
 - Rivet Nuts
 - Toggle Clamps
 - Snap Latches
 - Ring-Grip Quick Release Pins
 - studs and cotter pins

Source: <https://www.chiefdelphi.com/t/best-methods-of-bumper-mounting/152160/42>

<https://www.chiefdelphi.com/t/bumper-mounting/349135/24>

<https://www.chiefdelphi.com/t/1678-bumper-mount-questions/360409/2>



Credits

- This lesson was written by FRC 8027 for FRCTutorials.com
- You can contact the author at team@droidsrobotics.org



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