Baja Car Body Panel Attachment

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Project Goals/Purpose:

- To decrease the weight of the Baja Car to increase its maximum speed.
- Achieved by focusing on attaching body panels with lighter fastening methods.
- To determine which method of attachment was lightest while still remaining stable enough to keep the body panels fastened.

Abstract:

While working with the Baja team and primarily focusing on the attachment method for the body panels, the main purpose of the research project was to reduce the total weight of the car to make it faster. After researching multiple methods while also considering the Society of Automotive Engineers (SAE) safety and regulation constraints, two methods were compared. Attachment methods such as metal ring clamps or zip ties are extremely light, but do not meet these requirements. It was determined that welding short segments of 3/32'' diameter carbon steel rod to the frame of the car was comparable to the strength of the fastener tabs that are normally used, but significantly lighter. This is demonstrated on a small test frame that we welded together to represent the frame of the car.

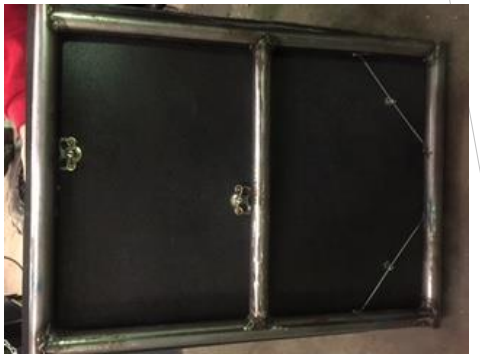
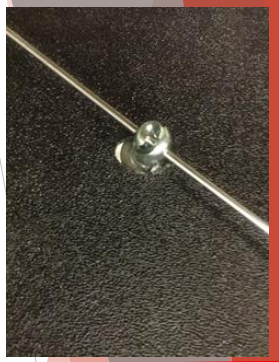



Methodology:

- Brainstormed multiple methods that would be lighter than the original fastener tabs used on the 2014 Baja Car
- Zip ties – Much lighter; did not meet SAE Baja regulations
- Metal ring clamps – Also light; too sharp for SAE safety
- Fastener tabs the Baja Team planned to use on the 2015 car – Lighter than last year's; still excess weight

Methodology (Continued):

- 12L14 Carbon Steel Tight-Tolerance Rod with 3/32" Diameter - Very light, relatively easy to prepare and attach, and as strong as a fastener tab
- Assembled a small test frame and divided the two attachment methods with a center bar
- Two fastener tabs for the 2015 Baja Car were welded on one half of the test frame
- Two 9-inch rod segments were welded to the other half of the test frame
- Pressure was applied to the body panel over both of the attachment methods
- Both methods remained intact

Results:

- Both the 2015 Fastener Tabs and the carbon steel rod segments were lighter than last year's attachment method
- Carbon Steel rods were much lighter, and still as strong as the fastener tab method
- Recommended this new rod attachment method to the Baja Team

Attachment Method	Mass (kg)	Total Mass based on 58 Attachments
2014 Fastener Tab	0.015	1.392 kg
Dzus Bolt for 2014 Tab	0.009	
2014 Tab + Dzus Bolt	0.024	
2015 Fastener Tab	0.018	1.276 kg
Dzus Bolt for 2015 Tab	0.004	
2015 Tab + Dzus Bolt	0.022	
9" Segment of Carbon Steel Rod	0.008	.696 kg
2015 Dzus Bolt (both Dzus bolts work with this method)	0.004	
Mass dropped from 2014 method		**.696 kg**

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