

# FSAE Brochure

Included in this catalog is the summation of all the parts produced for the FSAE competition by RCV Performance Products.



Updated 2/25/20  
RCV Performance  
2020 Season





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## Contact Info:

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sales@rcvperformance.com

## Note:

Prices shown are subject to change without notice.

The data contained in this catalog has been thoroughly checked for accuracy; however, we cannot assume any responsibility for errors, omissions, or typographical mistakes that may appear.

**Product details & information can be found on our website at:**

<https://www.rcvperformance.com/fsae.html>

## Steel Axle Kit

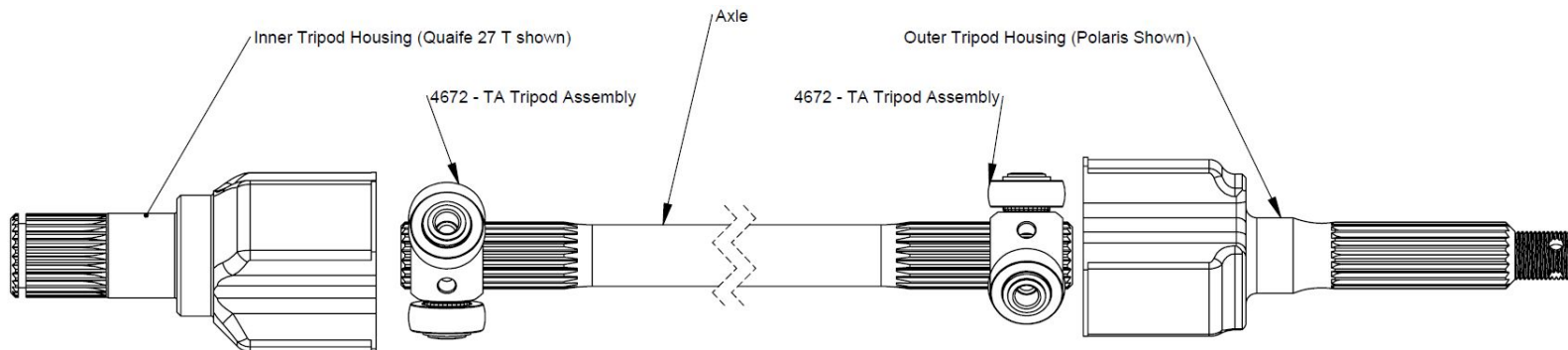
This is the new and improved steel axle set that is being produced by RCV Performance. Literally every single component has been FEA optimized for reduced weight and maximum strength with a great deal of destructive testing done to follow up the FEA optimization. Compared to the original products, more than 3 pounds per axle has been shaved off with no loss in performance. That being said, the new axles weigh from four to five lbs depending on length. To achieve this, each tripod housing was profile milled around the tripod shape and the stub shafts were bored out. Then the tripod was modified to improve strength and reduce weight. Next, the axle was changed from a gun drilled billet to a formed DOM tube for reduced weight, faster turnaround time, and improved concentricity. Last, the plunging / centering system was discarded based on testing and observations. The result is one of the lightest steel axle assemblies around, all for one of the best prices you can find.

We have developed **more** options for the inboard and outboard housings. We now support the Wavetrack differential, Miata wheel hub, as well as Hyper racing's hub-less wheel center. This allows the wheel center and bearings to mount directly to the tripod housing, therefore effectively removing the need for a wheel hub.

A couple quick technical notes for you. **First, these axles are limited to about 12 degrees of angle.** The tripods will wear out very quickly at higher angles, and if they are plunged all the way into the tripod housing the bar can contact the housing. **Second, you will have to cut your own snap ring grooves and cut the axle to its final length.** Third, we do not supply the spindle nuts for the outboard joints, or the snap rings / bolts for your diff. (Look for recommendations in the FAQ sections!) You should source those yourself as a lot of teams use different parts.

**So, here is what's included in a "kit":**

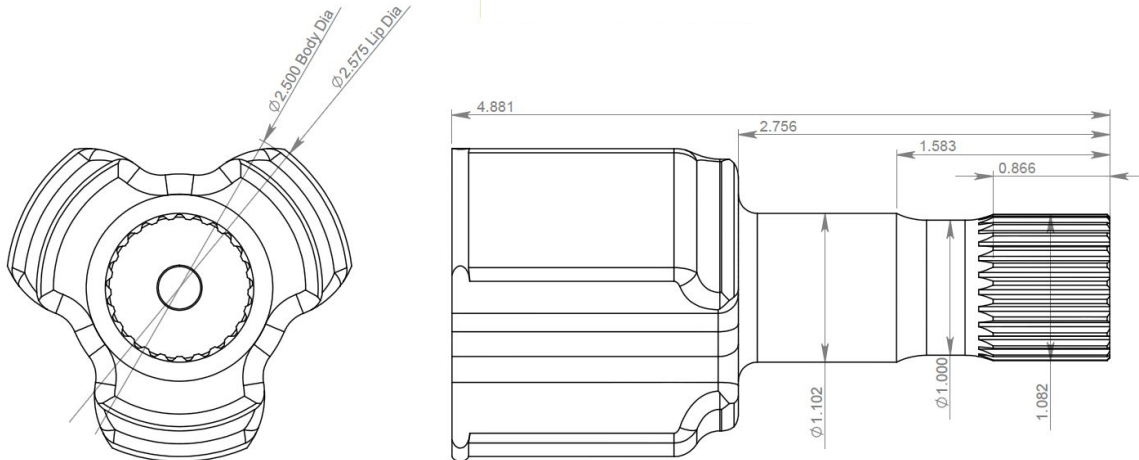
- 2 x Inboard lightened tripod housings. Choose from the available options below.
- 2 x Outboard lightened tripod housings. Choose from the available options below.
- 4 x RCV Performance Triangular CV Boots.
- 4x RCV Billet Tripods
- 2 x Custom Length Axles, Input lengths for right and left side below.
- 10 x Snap Rings



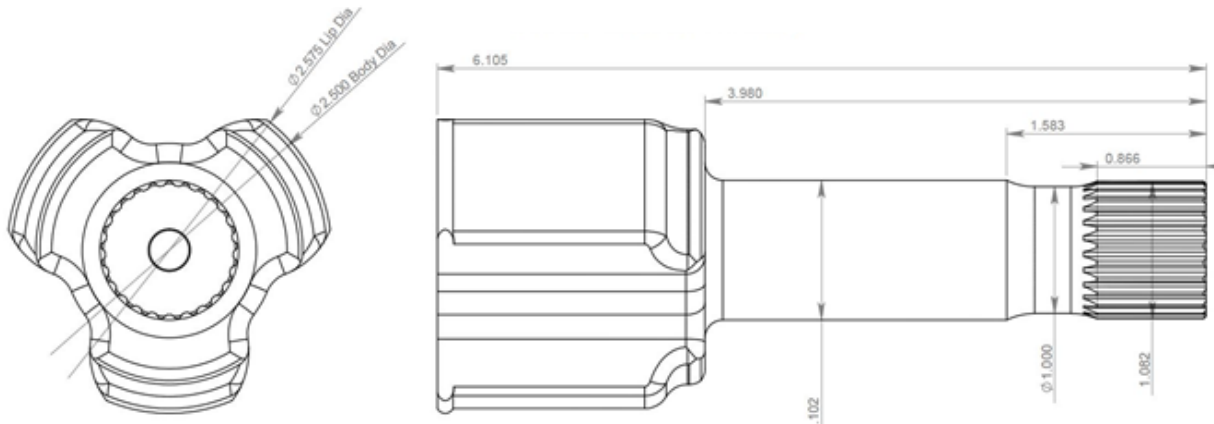
Note: The Torsen style inner tripod housings and stub axles are cut to length. Since teams are required to make their own housings, we offer an extended length stub on the tripod housing and stub axle. Use a carbide cutting tool on a lathe, or a grinding disk to cut as the material is hardened.

**Inboard Tripod Housing options (individual pricing included):**

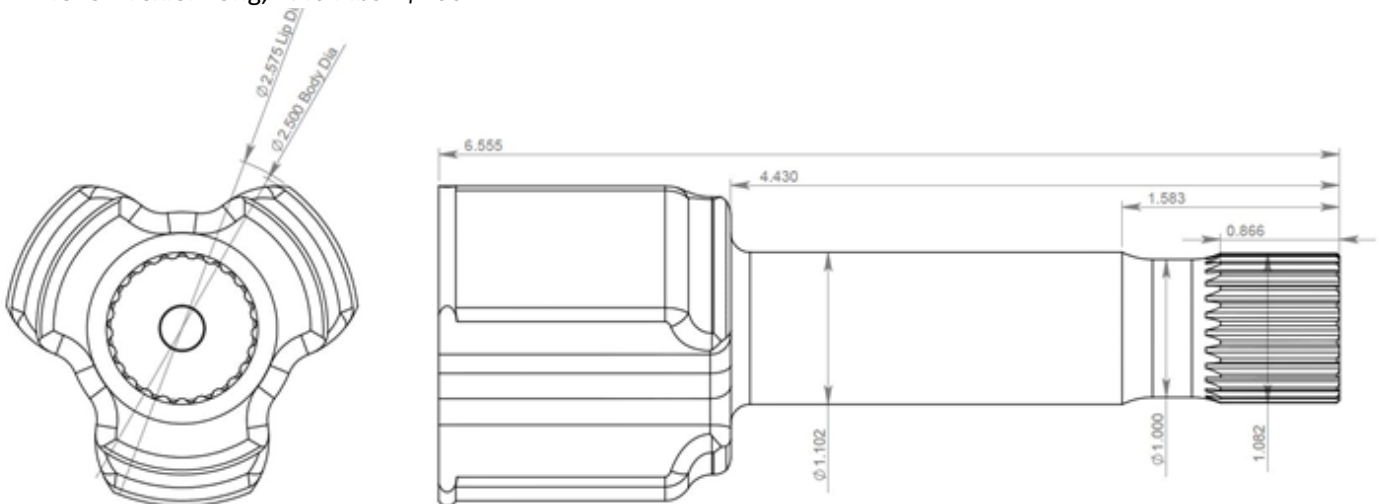
D4630 Drexler Short 1.11 lbs - \$260



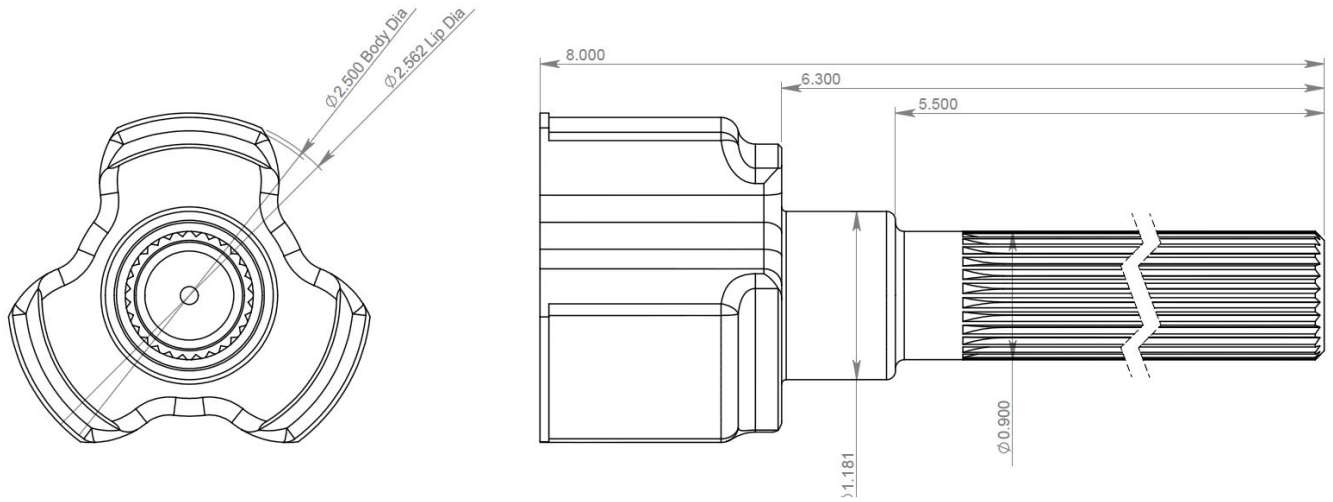
D4824 Drexler Medium, 1.325 lbs - \$260



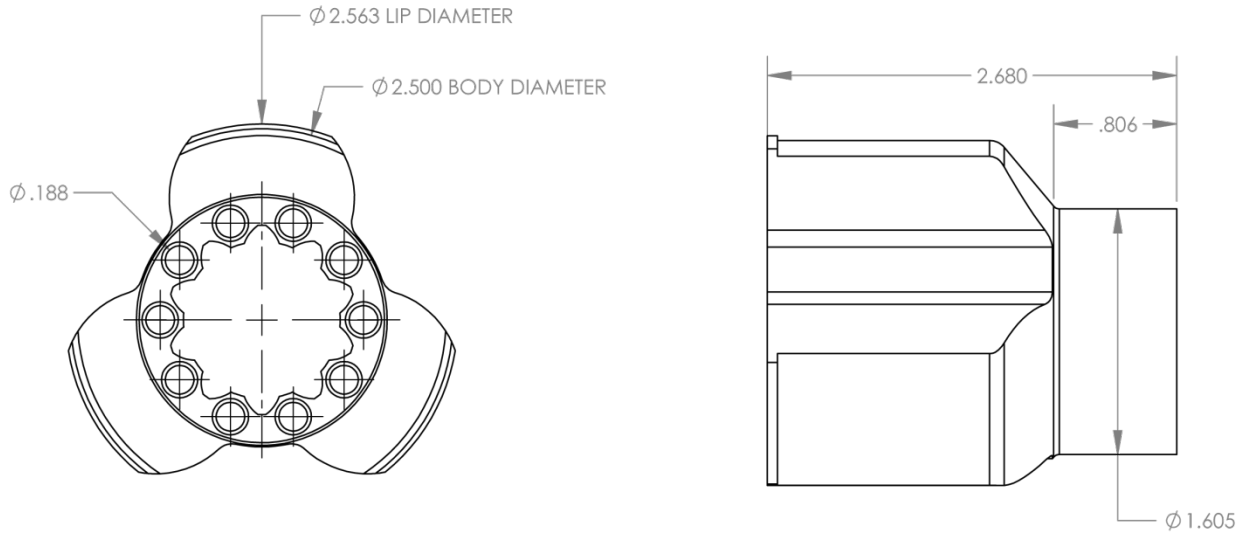
D4825 Drexler Long, 1.404 lbs - \$260



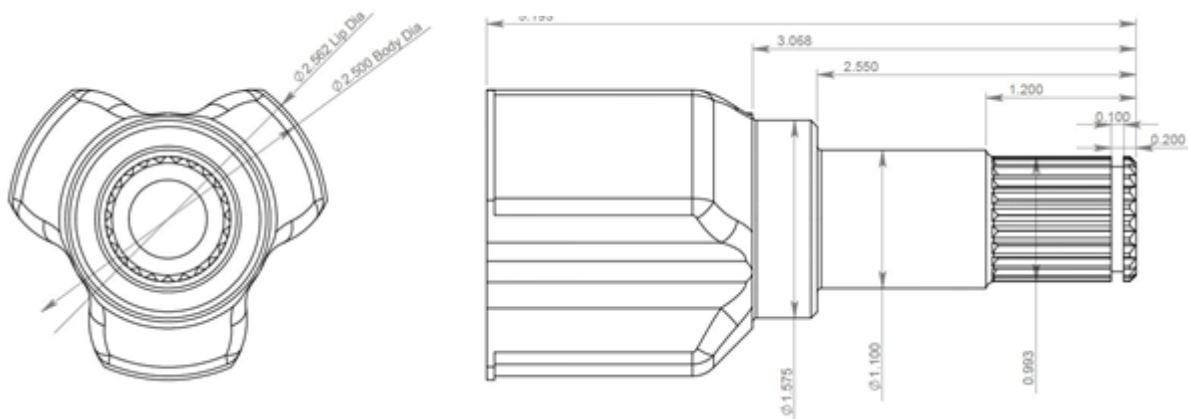
D4486 Torsen, 1.27 lbs - \$260



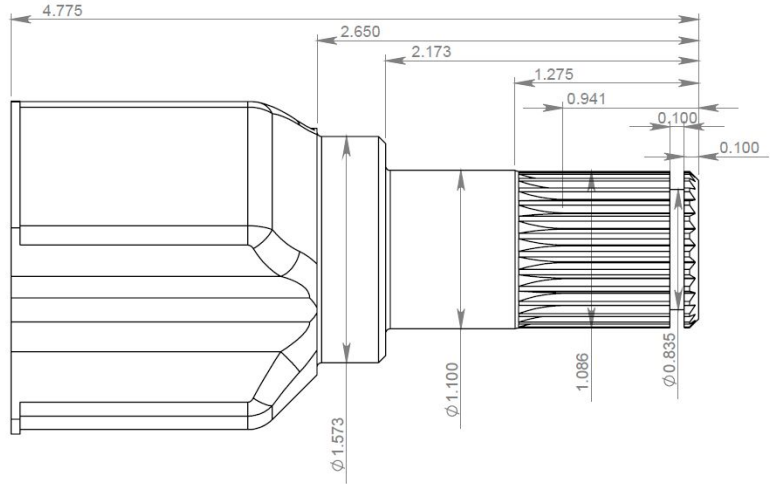
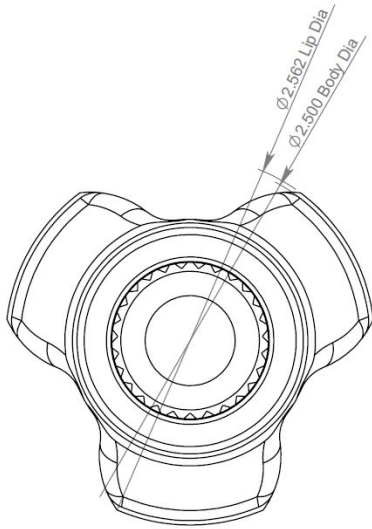
D4600 Taylor Race Engineering Diff, .7lbs - \$260



D4671 Quaife 23 Tooth (Ford), 1.21 lbs - \$260

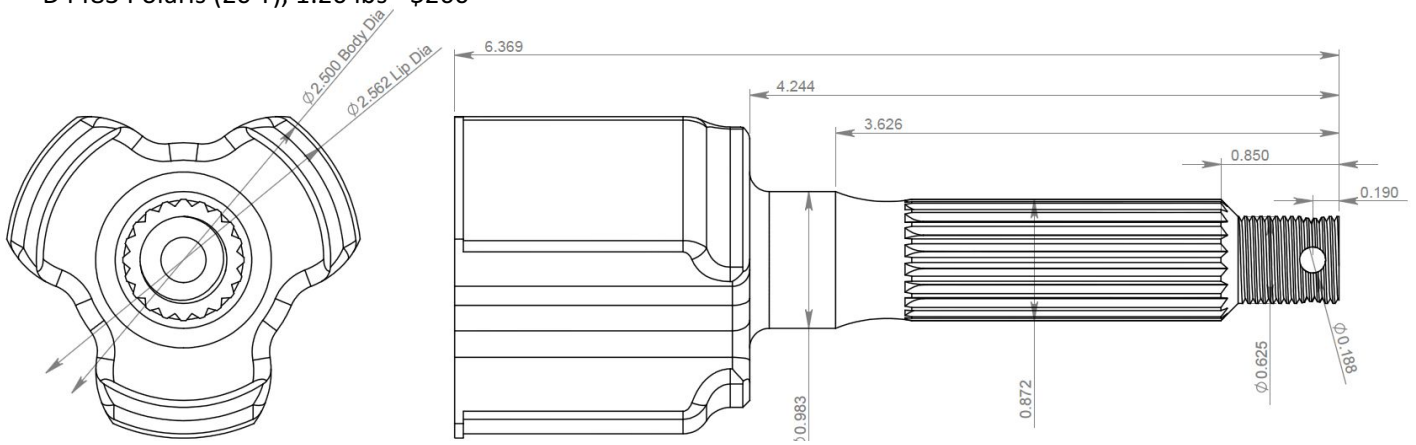


INV-02004202 (D4485) Quaife 27 Tooth (Honda), 1.17 lbs - \$260

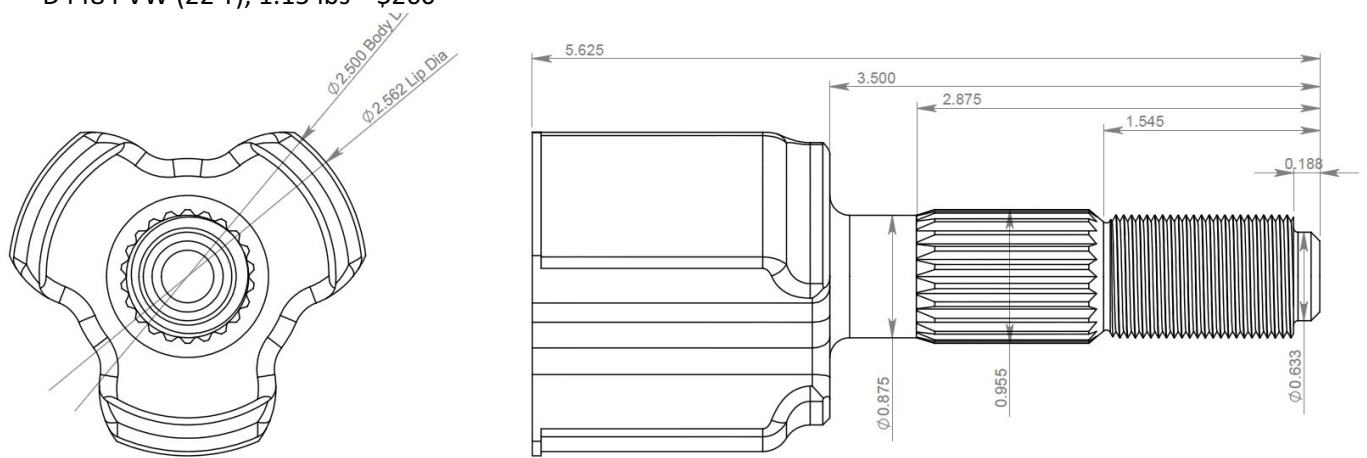


**Outboard Housing Options:**

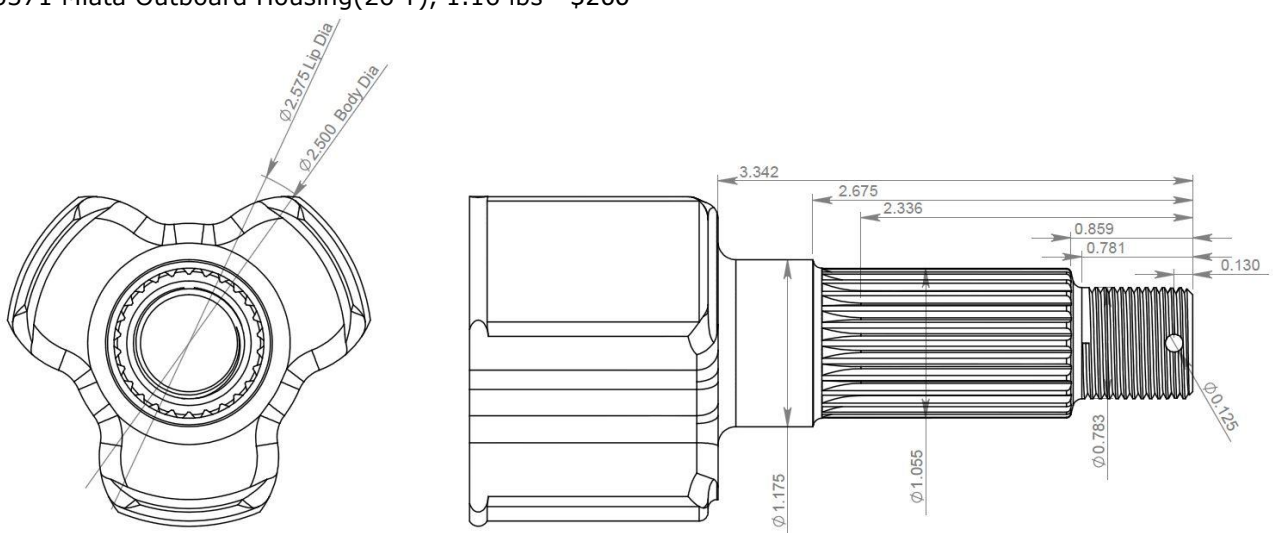
D4483 Polaris (20 T), 1.20 lbs - \$260



D4484 VW (22 T), 1.15 lbs - \$260

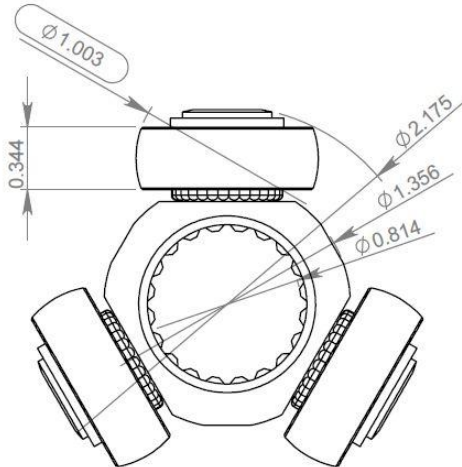


D5371 Miata Outboard Housing(26 T), 1.16 lbs - \$260



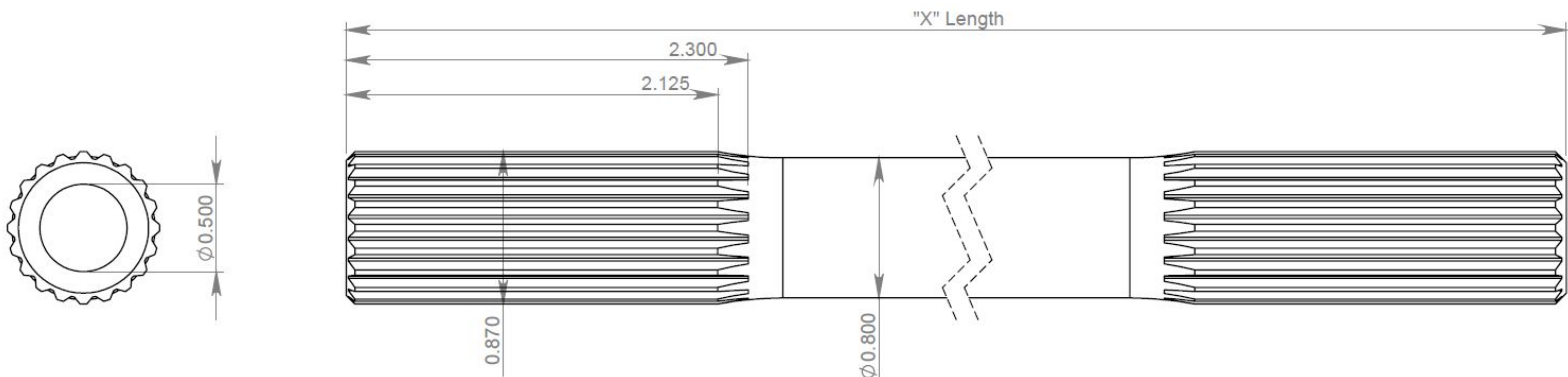
**Tripods**

D4672-TA Lightened FSAE Tripod For Tripod Housing, .33 - \$105



**Axle Length options:**

- 2020-1100 (D5158)-- 11", 1.02 lbs - \$260
- 2020-1300 (D5157)-- 13", 1.19 lbs - \$260
- 2020-1500 (D5115)-- 15", 1.36 lbs - \$260
- 2020-1700 (D5159)-- 17", 1.54 lbs - \$260
- 2020-1900 (D5160)-- 19", 1.71 lbs - \$260
- 2020-2108 (D5210)—21.08", 1.88 lbs - \$260
- 2020-2300 (D5283)-- 23", 2.06 lbs - \$260



**Boot**

615-3 Triangular Boot for Tripod Housings— \$12

**Snap Ring**

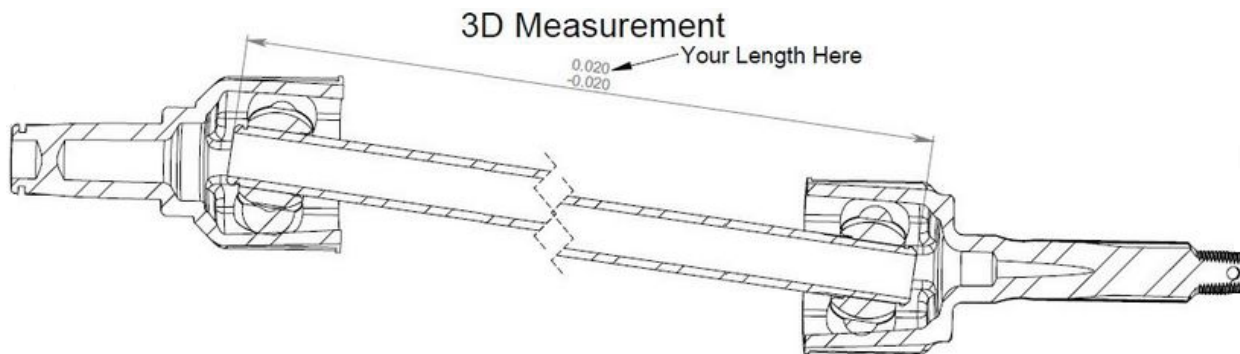
214-54 Steel Axle Kit Snap Ring – \$1



### How to determine axle length by setting the car at ride height using a 3D model:

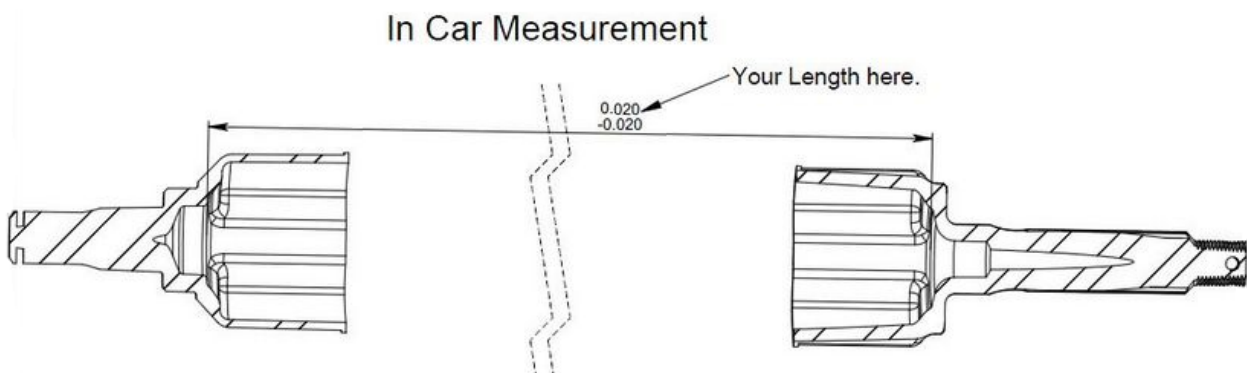
- Add the provided .step file axle components to your assembly.
- Locate the tripod housings to the differential and wheel hub.
- Mate the tripods to the standardized axles.
- Center the Inboard Tripod in its respective housing.
- Adjust the overall axle length until the outboard tripod is centered in the housing at ride height.
- Once this is done, the axle length is simply the length of the shaft.
- The additional components on the website are provided for you to build a full assembly of the axles.

Please feel free to contact us at [sales@rcvperformance.com](mailto:sales@rcvperformance.com) if you have any questions. NOTE: Overall axle length simply means the entire length of the axle, not the cup to cup distance or the center of CV distance to center of CV distance. Please see the of the "3D measurement" drawing for more details.

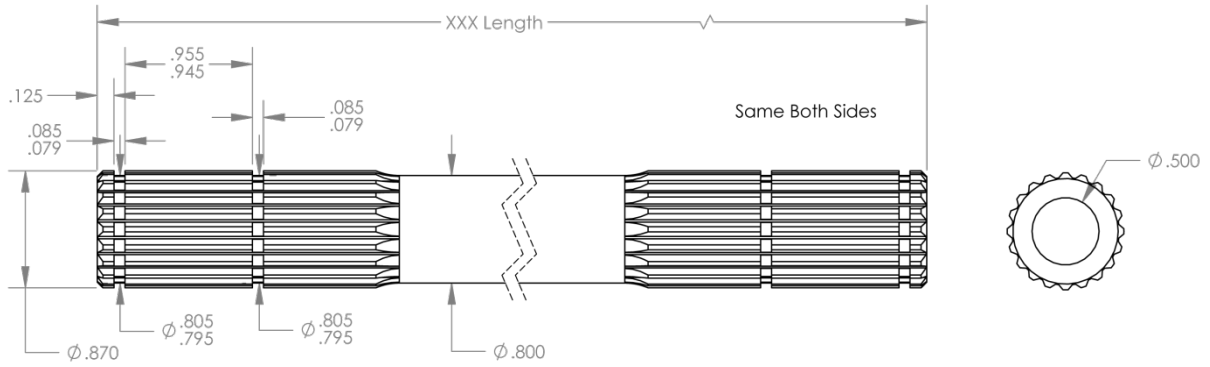


### How to determine the axle length using your actual vehicle:

- First, contact us at [sales@rcvperformance.com](mailto:sales@rcvperformance.com) to request the tripod housings. We will send you the appropriate outer and inner tripod housings for you to get actual measurements.
- Once you have received the parts, set the car at maximum bump or the point at which the tripod housings are closest together.
- Then measure the distance between the back of the tripod housing to the back of the tripod housing minus .500".
- Send the right and left side dimensions to [sales@rcvperformance.com](mailto:sales@rcvperformance.com), and we will send you the appropriate length axle. Please see the "in car" measurement drawing below.



**Snap ring groove cutting print and information:**



**Machining Notes:**

- Snap ring grooves must be machined as noted. Axle length may be shortened.
- To cut grooves, use proper width cutting tool on lathe and cut splines slowly (~100 RPM) to avoid chatter due to high hardness. The axle length may be reduced in the same fashion.

## Wheel Hubs & Brake Rotors

To complement our lightweight steel axles, RCV now offers a line of wheel hubs for FSAE cars. There are 2 models: front hubs and rear hubs that have integrated tripod housings. They all have a very standard 4 x 100mm bolt pattern and have attachment points for floating brake rotors. Currently, we are making brake rotors in 10", 9", and 220mm variations.

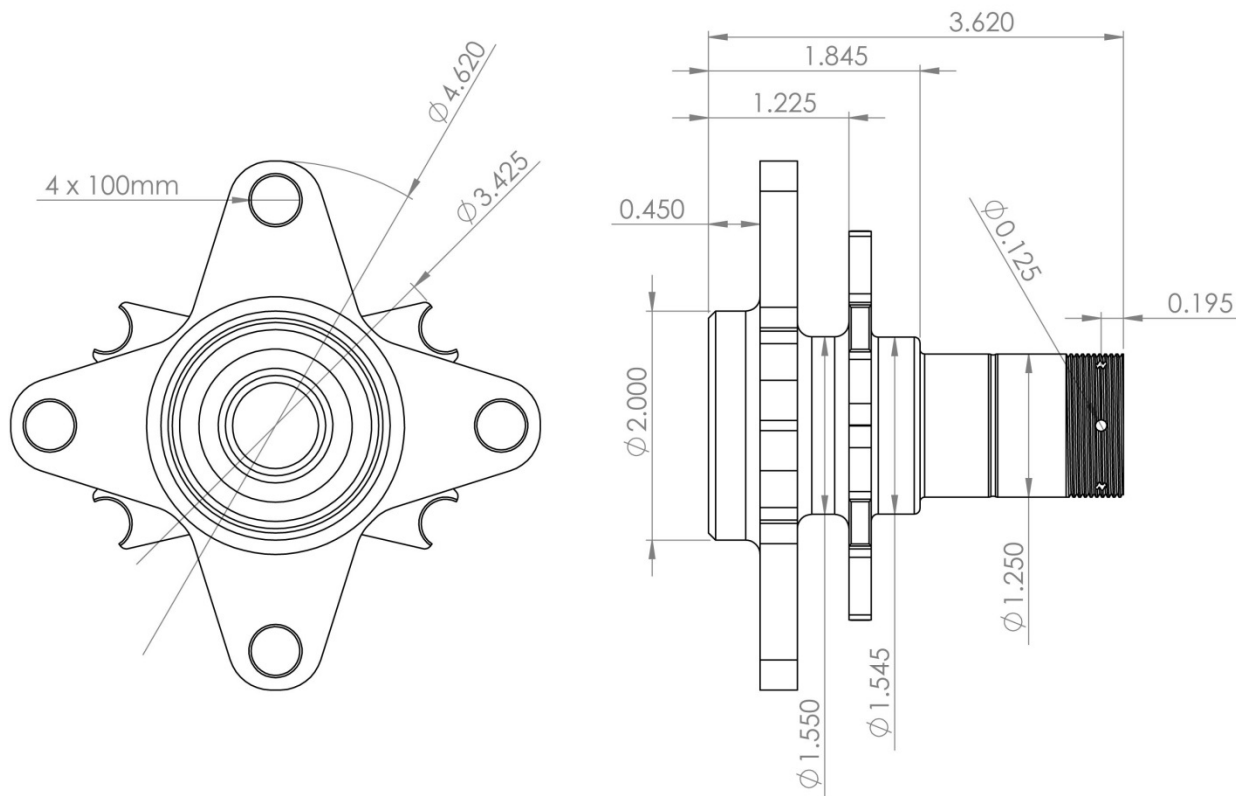
Each one of our wheel hub designs has undergone extensive testing and development over the past 9 months. They all feature hollow titanium wheel studs, and are constructed of 4340 steel. This provides maximum strength and minimal strength degradation due to fatigue. Not only was a great deal of FEA testing done, but a test stand was developed to apply a constant cyclical load to verify fatigue would not be a problem over the life of an FSAE car.

We also have lug nuts for 3.25 each.

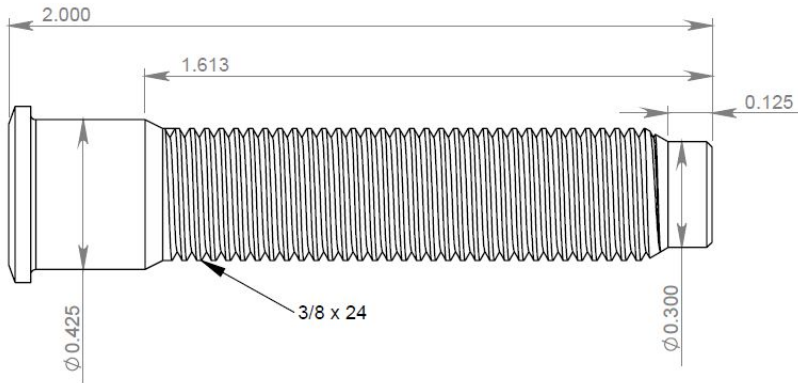
### Wheel Hub Kits:

#### D5116-HA: Front Wheel Hub Kit – Total: \$685

D5116 Front Wheel Hub (1), 1.7 lbs - \$385

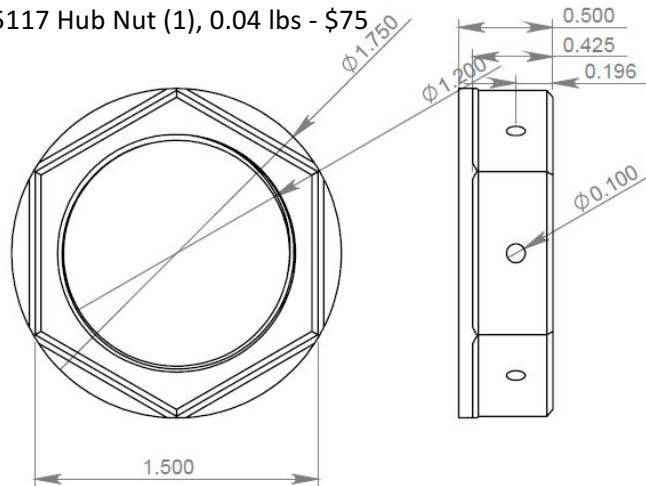


D5124 Titanium Studs (4), 0.03 lbs - \$50 ea



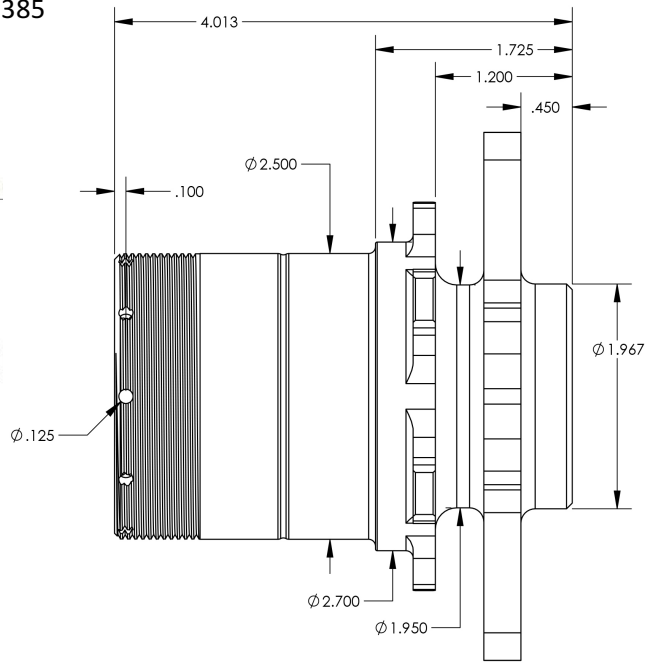
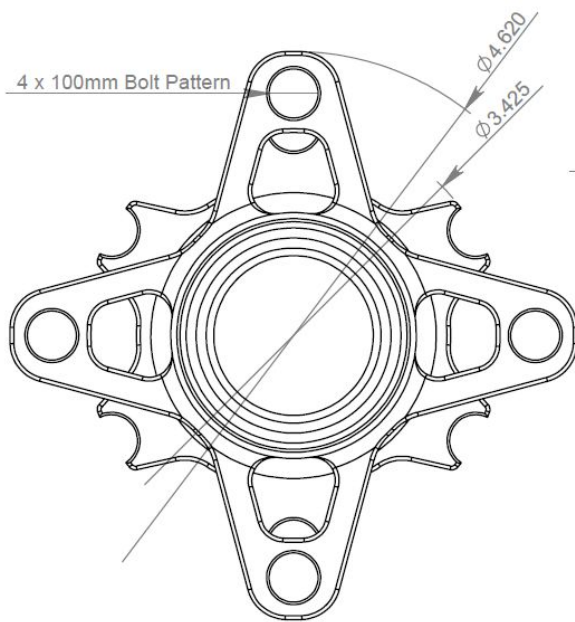
.375x24LUG – 3/8-24 Lug Nut - \$3.90  
- Lug nut features a 60 degree taper

D5117 Hub Nut (1), 0.04 lbs - \$75

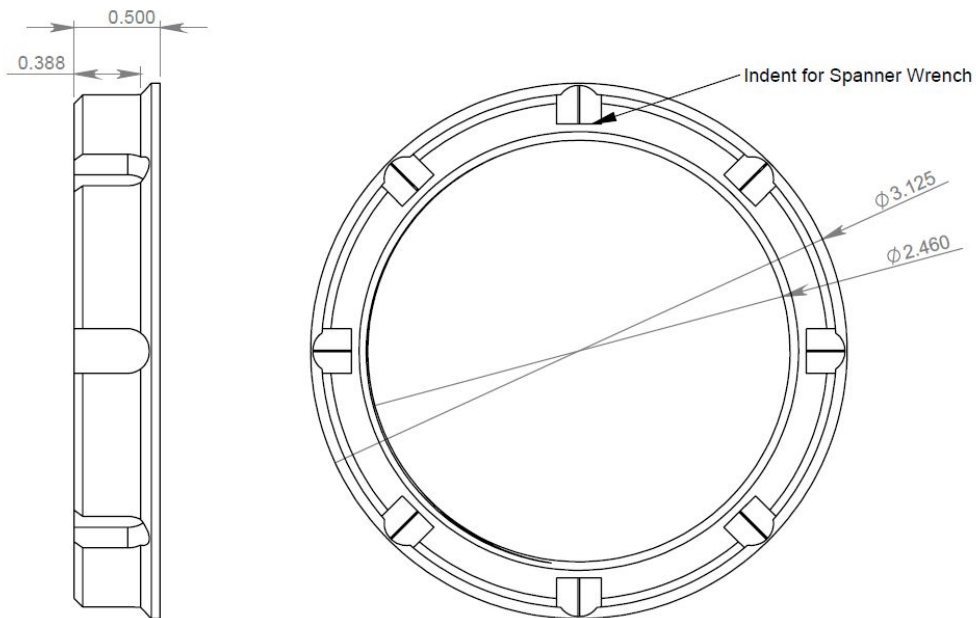


**D5580-HA: Rear Wheel Hub Housing Kit – Total: \$700.50**

D5580 Rear Wheel Hub Housing (1), 2.6 lbs - \$385



**D5239 Hub Nut (1), 0.10 lbs - \$90**



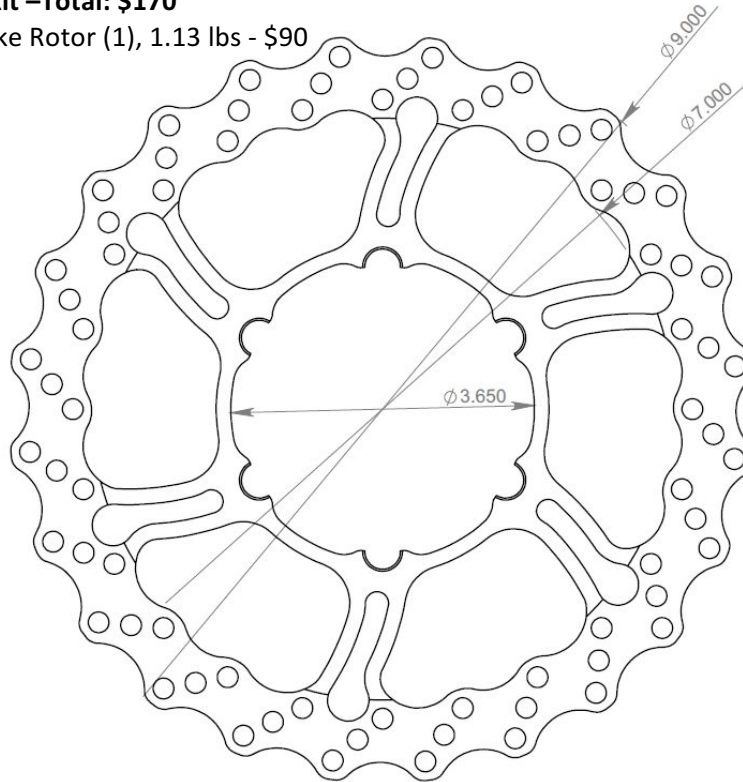
**D5124 Titanium Studs (4), 0.03 lbs - \$50 ea**

185-10C Boot (1) \$12

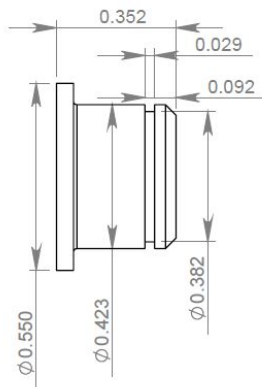
**Brake Rotor Kits:**

**D5107-RA: 9" Rotor Kit –Total: \$170**

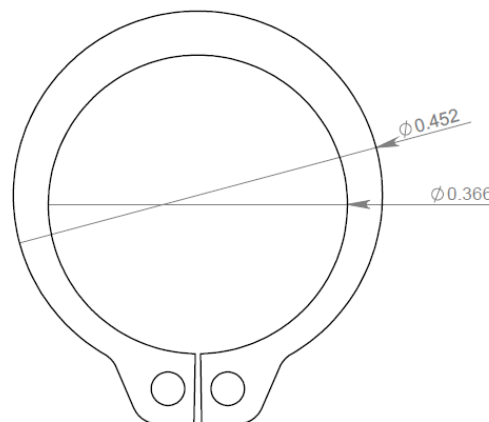
D5107 9" Brake Rotor (1), 1.13 lbs - \$90



D5141 Rotor Pin (6), 0.01 lbs - \$15 ea

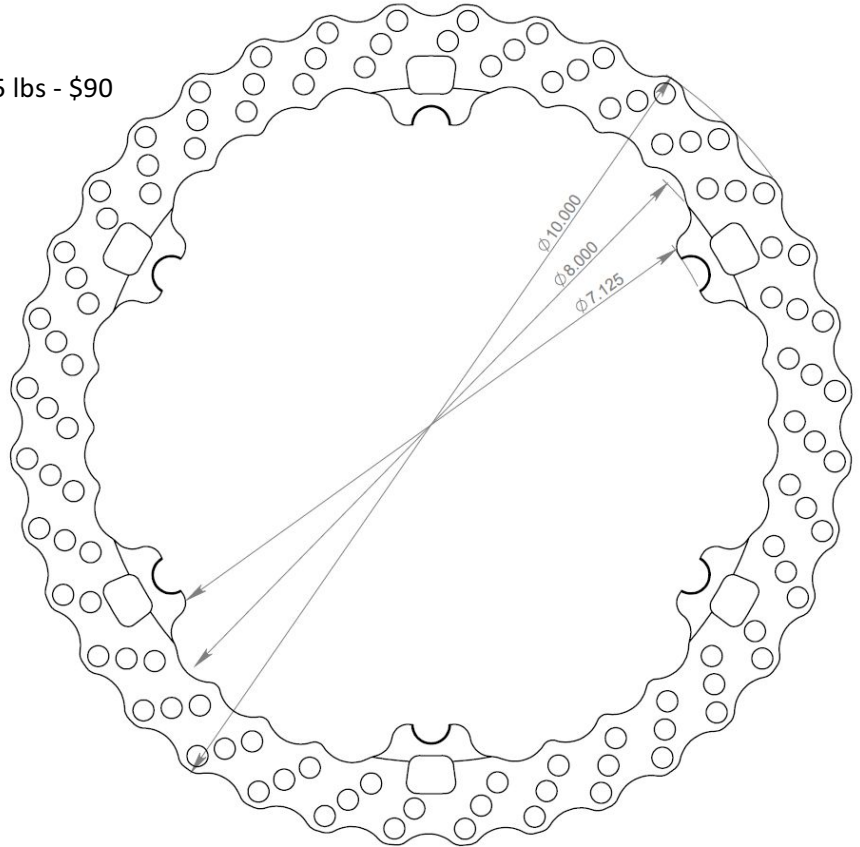


MCM97633A180 Snap Ring (6) \$.60 ea

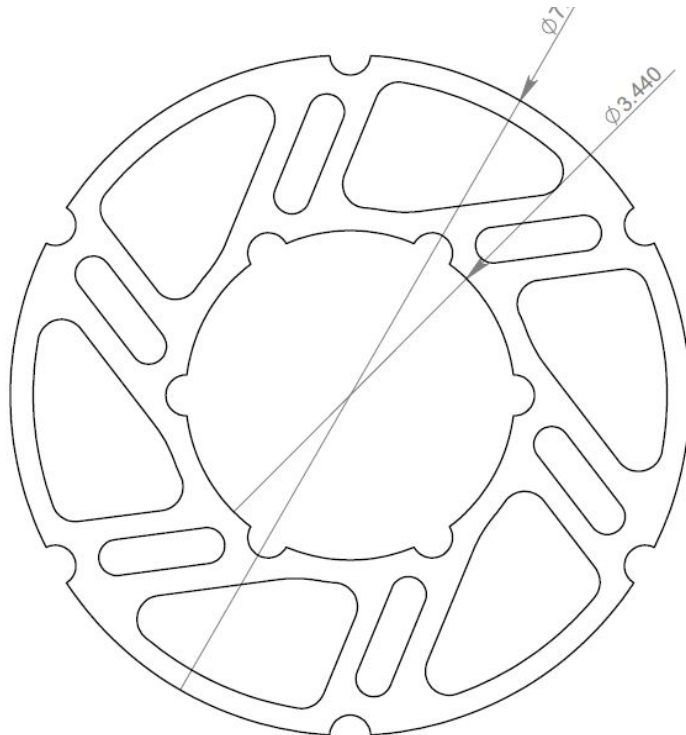


**D5108-RA: 10" Rotor Kit – Total: \$330**

D5108 10" Brake Rotor (1), 0.95 lbs - \$90



D5109 Rotor Floater (1), 0.27 lbs - \$85



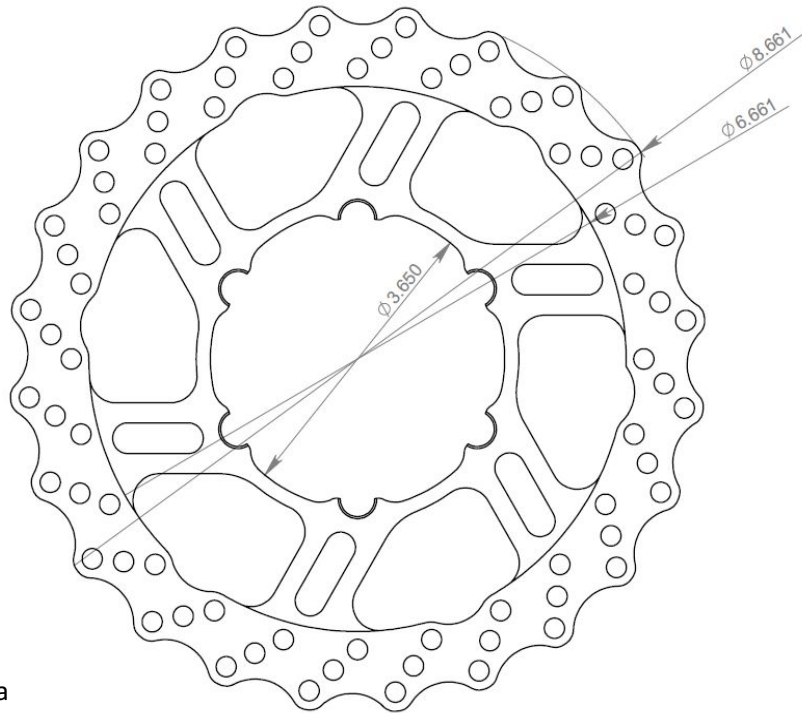
D5141 Rotor Pin (12) - \$15 ea

MCM97633A180 Snap Ring (12) \$1 ea



**D5284-RA: 220mm & 4.5mm Thick Rotor Kit -Total: \$185**

D5284 220mm & 4.5mm Thick Brake Rotor (1), 1.29 lbs \$105

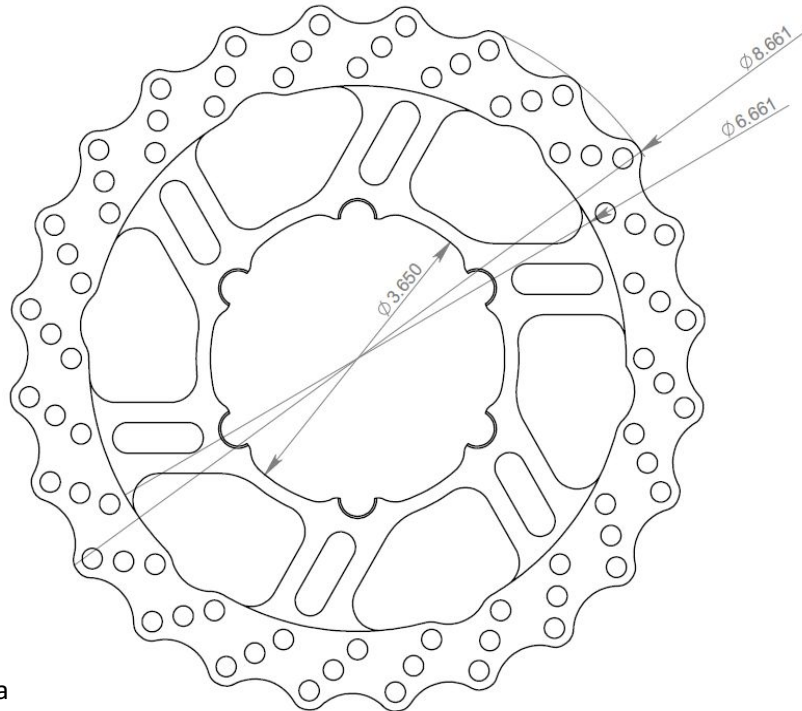


D5141 Rotor Pin (6) \$15 ea

MCM97633A180 Snap Ring (6) \$1 ea

**D7352-RA: 220mm & 4mm Thick Rotor Kit -Total: \$185**

D7352 220mm & 4mm Thick Brake Rotor (1), 1.25 lbs \$105



D5141 Rotor Pin (6) \$15 ea

MCM97633A180 Snap Ring (6) \$1 ea



**Bearing Components (2 needed per hub):**

**FSAE-BP-F:** Front Hub Bearing Kit: 0.35 lbs – Total: \$75

Bearing (1.25" ID) (1)

Bearing Cup (2.3125" OD) (1)

**FSAE-BP-R:** Rear Hub Bearing Kit: 0.96 lbs – Total: \$189

Bearing (2.5" ID) (1)

Bearing Cup (3.7175" OD) (1)

**Complete Hub & Brake Kits:**

**FW9HA:** Front Wheel Hub (D5116-HA), 2x Bearings (FSAE-BP-F), & 9" Brake (D5107-RA), 3.75 lbs - \$975

**FW10WHA:** Front Wheel Hub (D5116-HA), 2x Bearings (FSAE-BP-F), & 10" Brake (D5108-RA), 3.90 lbs - \$1050

**FW220HA:** Front Wheel Hub (D5116-HA), 2x Bearings (FSAE-BP-F), & 220mm Brake at 4.5mm Thick (D5284-RA), 3.91 lbs- \$990

**FW220HA-4MM:** Front Wheel Hub (D5116-HA), 2x Bearings (FSAE-BP-F), & 220mm Brake at 4mm Thick (D7352-RA), 3.91 lbs- \$990

**RT9WHA:** Rear Wheel Hub (D5580-HA), 2x Bearings (FSAE-BP-R), 9" Brake (D5107-RA) & Boot, 6.40lbs - \$1250

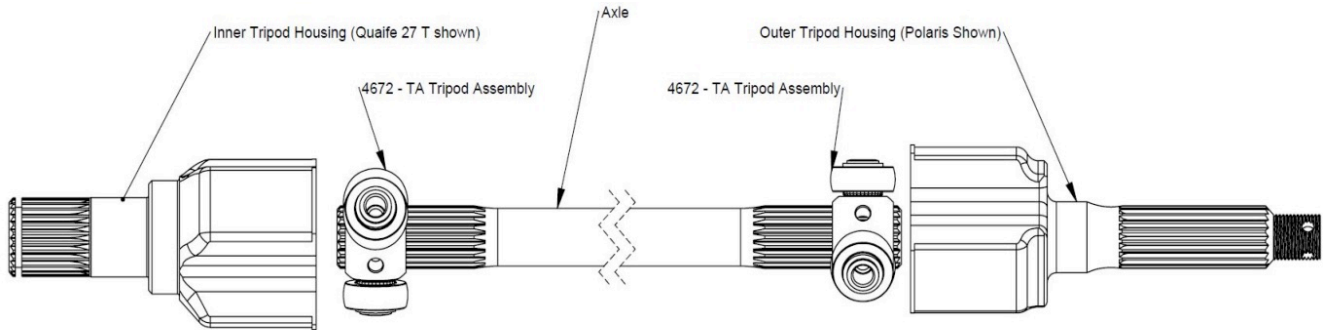
**RT10WHA:** Rear Wheel Hub (D5580-HA), 2x Bearings (FSAE-BP-R), 10" Brake (D5108-RA) & Boot, 6.55 lbs - \$1400

**RT220WHA:** Rear Wheel Hub (D5580-HA), 2x Bearings (FSAE-BP-R), 220mm Brake at 4.5mm Thick (D5284-RA) & Boot, 6.24 lbs - \$1250

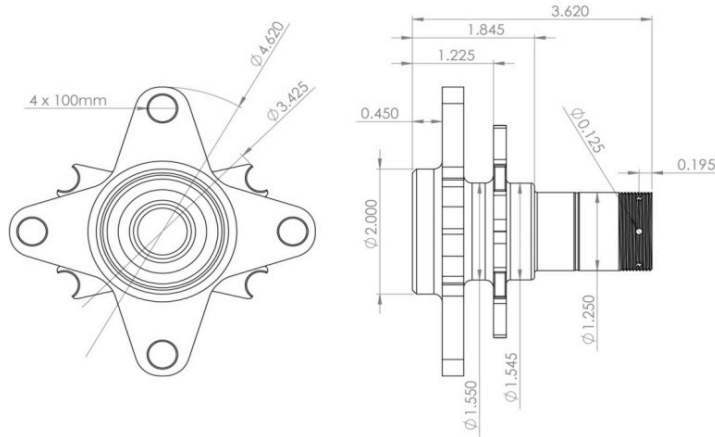
**RT220WHA-4MM:** Rear Wheel Hub (D5580-HA), 2x Bearings (FSAE-BP-R), 220mm Brake at 4mm Thick (D7352-RA) & Boot, 6.24 lbs - \$1250

## Kit Breakdown/Ordering Details

### Steel Axle Kit



**Front Hub with Brake Kits**



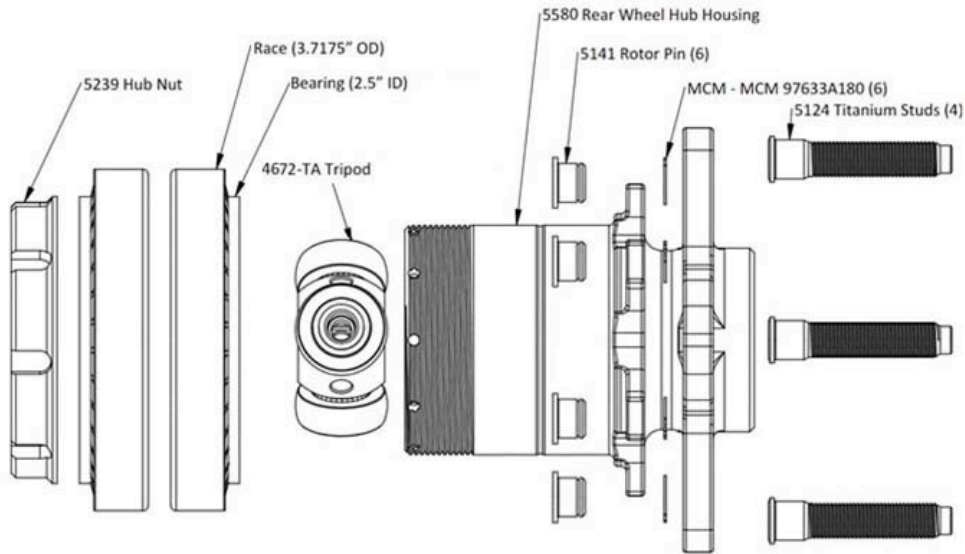
<b>FW9HA - Front Hub &amp; 9" Brake Kit (\$848.40)</b>
<b>D5116-HA - Front Wheel Hub Kit (1)</b>
-D5116 - Front Wheel Hub (1)
-D5124 - Titanium Studs (4)
-D5117 - Front Hub Nut (1)
<b>FSAE-BP-F - Front Hub Bearing Kit (2)</b>
-Bearing (2)
-Bearing Outer Race (2)
<b>D5107-RA - 9" Brake Rotor Package (1)</b>
-D5107 - 9" Brake Rotor (1)
-D5141 - Rotor Pin (6)
-MCM97633A180 - Snap Ring (6)

<b>FW10WHA - Front Hub &amp; 10" Brake Kit (\$988.80)</b>
<b>D5116-HA - Front Wheel Hub Kit (1)</b>
-D5116 - Front Wheel Hub (1)
-D5124 - Titanium Studs (4)
-D5117 - Front Hub Nut (1)
<b>FSAE-BP-F - Front Hub Bearing Kit (2)</b>
-Bearing (2)
-Bearing Outer Race (2)
<b>D5108-RA - 10" Brake Rotor Package (1)</b>
-D5108 - 10" Brake Rotor (1)
-D5109 - Rotor Floater (1)
-D5141 - Rotor Pin (6)
-MCM97633A180 - Snap Ring (12)

<b>FW220HA - Front Hub &amp; 220mm @ 4.5mm Brake Kit (\$860.40)</b>
<b>D5116-HA - Front Wheel Hub Kit (1)</b>
-D5116 - Front Wheel Hub (1)
-D5124 - Titanium Studs (4)
-D5117 - Front Hub Nut (1)
<b>FSAE-BP-F - Front Hub Bearing Kit (2)</b>
-Bearing (2)
-Bearing Outer Race (2)
<b>D5284-RA - 220mm @ 4.5mm Brake Rotor Package (1)</b>
-D5284 - 9" Brake Rotor (1)
-D5141 - Rotor Pin (6)
-MCM97633A180 - Snap Ring (6)

<b>FW220HA-4MM - Front Hub &amp; 220mm @ 4mm Brake Kit (\$860.40)</b>
<b>D5116-HA - Front Wheel Hub Kit (1)</b>
-D5116 - Front Wheel Hub (1)
-D5124 - Titanium Studs (4)
-D5117 - Front Hub Nut (1)
<b>FSAE-BP-F - Front Hub Bearing Kit (2)</b>
-Bearing (2)
-Bearing Outer Race (2)
<b>D7352-RA - 220mm @ 4mm Brake Rotor Package (1)</b>
-D5284 - 9" Brake Rotor (1)
-D5141 - Rotor Pin (6)
-MCM97633A180 - Snap Ring (6)

**Rear Hub with Brake Kits**



<b>RT9WHA - Rear Hub &amp; 9" Brake Kit (\$1079.40)</b>
<b>D5580-HA - Rear Wheel Hub Kit (1)</b>
-D5580- Rear Wheel Hub (1)
-D5124 - Titanium Studs (4)
-D5239 - Rear Hub Nut (1)
-185-10C - Rear Hub Boot (1)
<b>FSAE-BP-R - Rear Hub Bearing Kit (2)</b>
-Bearing (2)
-Bearing Outer Race (2)
<b>D5107-RA - 9" Brake Rotor Package (1)</b>
-D5107 - 9" Brake Rotor (1)
-D5141 - Rotor Pin (6)
-MCM97633A180 - Snap Ring (6)

<b>RT10WHA - Rear Hub &amp; 10" Brake Kit (\$1219.80)</b>
<b>D5580-HA - Rear Wheel Hub Kit (1)</b>
-D5580- Rear Wheel Hub (1)
-D5124 - Titanium Studs (4)
-D5239 - Rear Hub Nut (1)
-185-10C - Rear Hub Boot (1)
<b>FSAE-BP-R - Rear Hub Bearing Kit (2)</b>
-Bearing (2)
-Bearing Outer Race (2)
<b>D5108-RA - 10" Brake Rotor Package (1)</b>
-D5108 - 10" Brake Rotor (1)
-D5109 - Rotor Floater (1)
-D5141 - Rotor Pin (6)
-MCM97633A180 - Snap Ring (12)

<b>RT220WHA - Rear Hub &amp; 220mm @ 4.5mm Brake Kit (\$1091.40)</b>
<b>D5580-HA - Rear Wheel Hub Kit (1)</b>
-D5580- Rear Wheel Hub (1)
-D5124 - Titanium Studs (4)
-D5239 - Rear Hub Nut (1)
-185-10C - Rear Hub Boot (1)
<b>FSAE-BP-R - Rear Hub Bearing Kit (2)</b>
-Bearing (2)
-Bearing Outer Race (2)
<b>D5284-RA - 220mm @ 4.5mm Brake Rotor Package (1)</b>
-D5284 - 9" Brake Rotor (1)
-D5141 - Rotor Pin (6)
-MCM97633A180 - Snap Ring (6)

<b>Additional Item Need For Each Kit</b>
D4672-TA Tripod for Housings (\$90)

<b>RT220WHA-4MM - Rear Hub &amp; 220mm @ 4mm Brake Kit (\$1091.40)</b>
<b>D5580-HA - Rear Wheel Hub Kit (1)</b>
-D5580- Rear Wheel Hub (1)
-D5124 - Titanium Studs (4)
-D5239 - Rear Hub Nut (1)
-185-10C - Rear Hub Boot (1)
<b>FSAE-BP-R - Rear Hub Bearing Kit (2)</b>
-Bearing (2)
-Bearing Outer Race (2)
<b>D7352-RA - 220mm @ 4mm Brake Rotor Package (1)</b>
-D7352 - 9" Brake Rotor (1)
-D5141 - Rotor Pin (6)
-MCM97633A180 - Snap Ring (6)



## Frequently Asked Questions

### A. Install Q's

- a. What measurements are needed?
  - i. Look to the “determining your axle length” section. That should be it
- b. Is there a plunging system?
  - i. No! There is NOT a need for one regardless of what you may have heard, and seen in the past.
- c. Does the lack of a plunging system increase the risk of the axle falling out?
  - i. You bet! However, measure and test fit everything correctly, and they won't. If you are extremely concerned about the axles falling out, you are more than welcome to try and figure out how to make your own plunging system. That being said, we have zero issues to date.
- d. Do these axles include the required snap rings, bolts, or spindle nuts for our car?
  - i. Nope, you are required to source those parts yourself.
- e. Do we have to cut our axles to length, and add snap ring grooves?
  - i. Yes. We did this to make the axles “stockable” items, and to keep model mismatch errors low.
- f. Do we have to cut the Torsen housings to length and add snap ring grooves?
  - i. Yep. We don't know how you made your torsen diff housing and therefore you need to modify the torsen housings accordingly.
- g. Why is my Drexler diff leaking fluid past the tripod housings?
  - i. You probably forgot the seals or the bolt. We recommend using either the seals from Drexler, or Deamar part number 28407 seals. They can be found in this catalogue: <http://daemar.com/wp-content/uploads/2013/11/Daemar-DMR-Shaft-Seals-Catalogue-COA-003-W.pdf>
  - ii. The bolts are M8 x 1.25 x 7.5mm length

### B. Purchasing Q's

- a. What is the best way to pay for the axles?
  - i. Components must be purchased direct through our website: <https://www.rcvperformance.com/fsae.html>
- b. What methods of payment are accepted?
  - i. Only credit cards are permitted for payment.
- c. How long do the axles take to ship?
  - i. Depending if we have the parts in stock anywhere from 1 day to 3 weeks for standard parts.
- d. What shipping services do you offer?
  - i. FedEx or USPS. That being said I VERY highly recommend using FedEx. USPS has nonexistent tracking, and can take up to 1 month to deliver.



C. Custom Q's

- a. Can you make custom axles?
  - i. No. We currently are only offering the products found in this brochure.
- b. Can you make custom tripod housings?
  - i. No. We currently are only offering the products found in this brochure.
- c. Do you make any other boots?
  - i. Yes, check out our boot catalog here:  
[http://www.rockfordcv.com/pdfstore/Boot\\_Assemblies.PDF](http://www.rockfordcv.com/pdfstore/Boot_Assemblies.PDF)



**Notes:**