



Bull Rider - 3D Printed Scooter print and assembly instructions

Scooter overview

The Bull Rider was designed by [Slicelab](#) in collaboration with Stratasys. The kick scooter is comprised mostly of 3D printed parts designed specifically for the Origin One machine. The additional parts needed are off the shelf components that can be easily purchased online and customized to user needs. Examples of such adjustments can be for the users height or weight metrics that impact how one rides the scooter. Additionally, there are components like the long-board trucks, that can be tightened or loosened to allow for more or less responsiveness in steering. In the following pages, the required tool set and steps to complete this assembly will be highlighted along with a list of the needed purchased parts and printed parts.

Bull Rider Assembly

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Bull Rider tools needed

Below are all the basic tools needed to assemble the scooter. Additional tools can be used to aid assembly.

Notes

The hardware that requires the Allen wrenches needs to be tightened from both sides, therefore, two tools are needed at the same time in these steps.



Allen Wrenches x 2 (A4, A8)



Screw Drivers (Flat head, Phillips Head)



Ratchet Set (3/8", 1/2")



Power Drill w/ Metal Bits (1/4", 13/64")



Adjustable Wrench



Metal Hack Saw



Jaw Locking Pliers



Adjustable Clamp

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items to purchase

Below is a list of the off-the-shelf parts that need to be purchased to assemble the scooter. Nearly all the parts can be found online at Amazon and have the hyperlinks below the images for your convenience.

Notes

Some products can change online or be no longer available. Reference the sizes and specs carefully in the case that a part needs to be substituted.



[Battery LED](#)



[Bearings](#)



[6.5" Solid Rubber Tires](#)



[Long-board Trucks](#)



[1.25" OD Aluminium pipe](#)



[Long-board Riser 1/8"](#)

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hardware needed

Below is a list of the off-the-shelf parts that need to be purchased to assemble the scooter. Nearly all the parts can be found online at Amazon and have the hyperlinks below the images for your convenience.

Notes

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[Self-Locking Hex Nut](#)
(1/2", 3/8")



[25mm Round
Connector Nuts M8](#)



[Rubber O Rings](#)



[Socket Cap Barrel Nuts](#)
(M6x20, M6x30, M6x45, M6x55)



[Fender Washer](#)



[Socket Cap Screws M8](#)



[Double Sided Screw Rod M8x65](#)



[Aluminium Washer &
Barring Spacer](#)



[1.75" Truck Screws](#)

Bull Rider

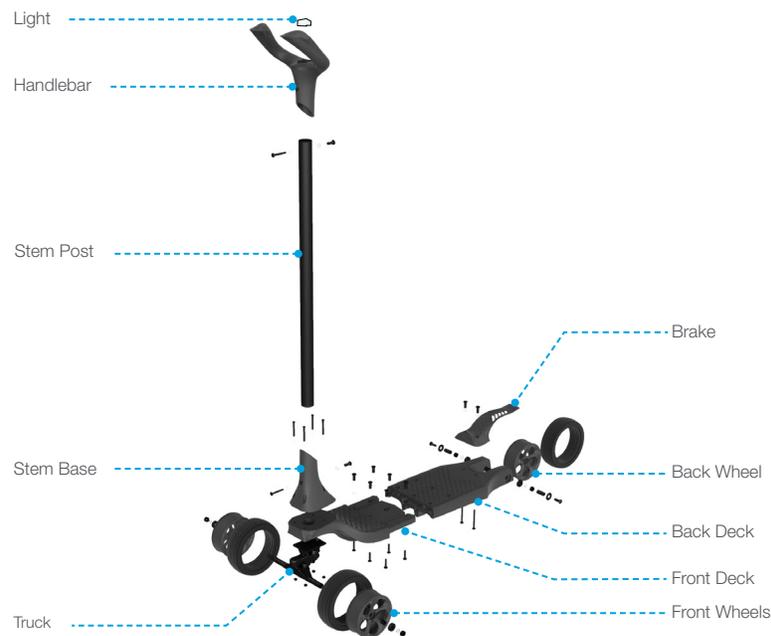
parts overview

Referenced Parts

Reference the diagram below for the names of the parts in the overall assembly. There are 7 unique parts that are 3D printed and 9 printed parts in total. The order of which the scooter is assembled will be highlighted in the subsequent pages. Certain steps require unique methods of assembly because of the tight spaces they lock into. All of the hardware is symmetrical along the length of the scooter but there are certain hardwares that need to be inserted before others due to the nature of the geometry.

Notes

Socket Cap Barrel Nuts have a male and female ends. The female ends, which are thicker, should be inserted first in all cases. Additionally, if prints have defects within the hardware slots, careful manual drilling may need to be done to clear the hole.



Step 1

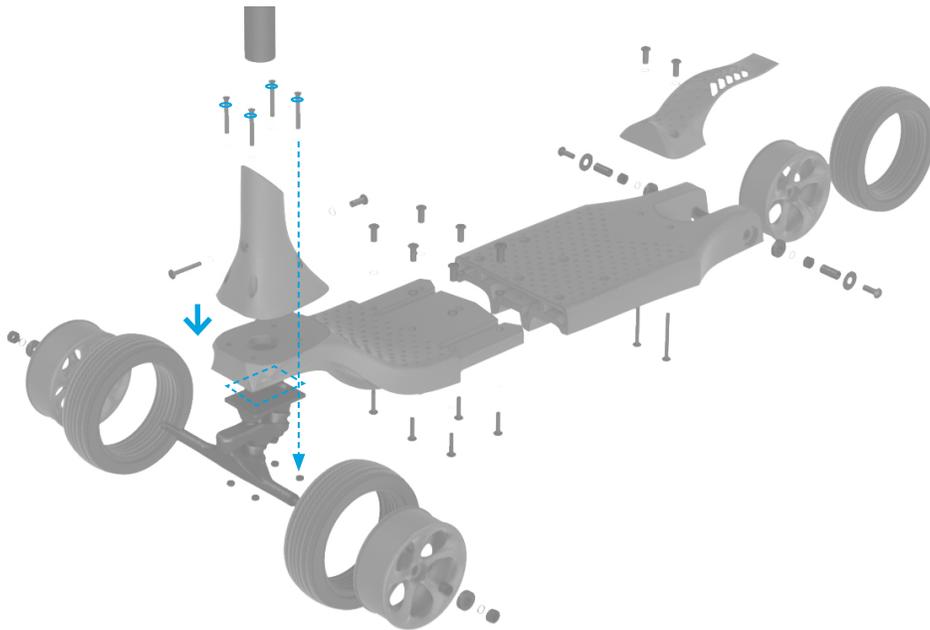
stem base connection

Stem Base to Front Deck

Connect the Stem Base to the Front Deck with (4) 1.75" Truck Screws to the metal base plate of the trucks. Make sure the 1/8" riser pad is sandwiched in-between the metal and rectangular slot on the underside of the Front Deck. Use a 3/8" ratchet to get into the tight space and evenly tighten all around. Slide 4 rubber O rings onto the top of the screws before putting them into the slots

Notes

Using a the Phillips head screwdriver, place the screws into the Stem Base, through the Front Deck, through the Riser pad and through the metal truck below and flip the whole assembly while also pressing all the parts together for an easier process to ratchet the hex nuts on.



Step 2

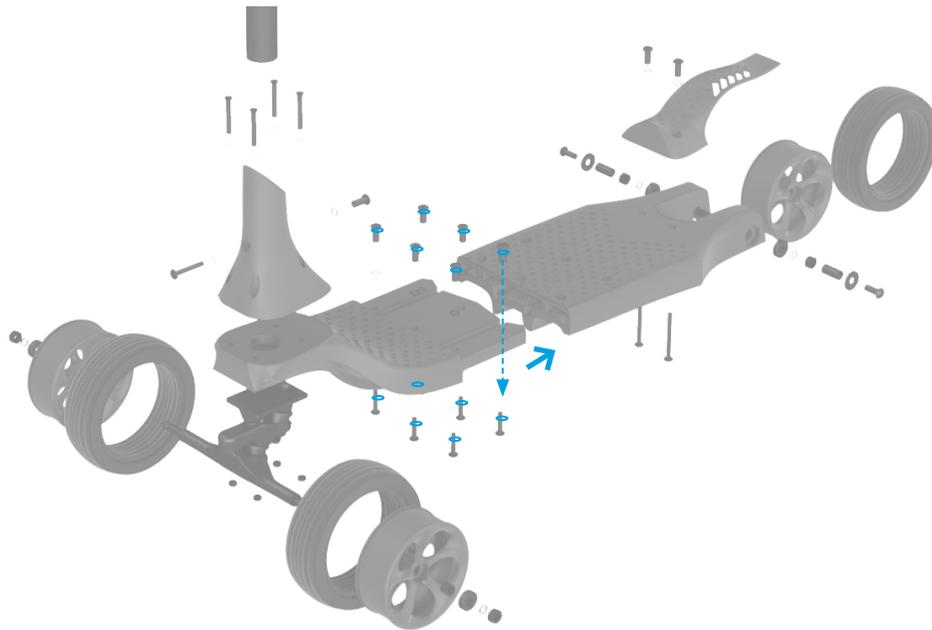
deck connection

Front Deck to Back Deck

Connect the Front Deck to the Back Deck with (2) M6x25 & (4) M6x45 Socket Cap Barrel Nuts. Make sure to insert female side first, this may require some light hammer like tapping on the ends as the hardware fits tightly within the slots. Use an M4 Allen wrench on either side to tighten evenly.

Notes

Slide 12 rubber O rings onto the top of the Socket Cap Barrel Nuts before putting them into the slots.



Step 3

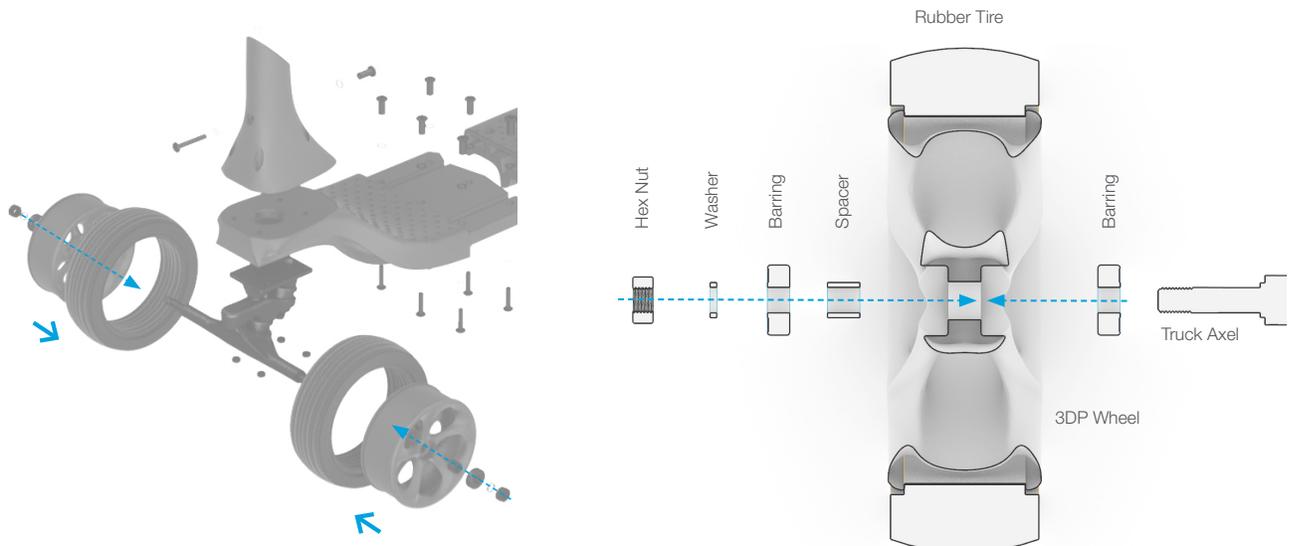
wheels to truck

Front Wheel Assembly

Mounting the wheels onto the axle, first by force fitting the rubber tires onto the 3DP wheels with the help of a flat head screwdriver until they lock into place. Second, with hammer like tapping, insert the (2) bearings into place on both sides of the wheel making sure to place the aluminum spacer in between the two. Lastly, place the assembled wheel onto the axle adding the small washer on the outside before tightening the nut with a 1/2" ratchet or adjustable wrench.

Notes

Do not over tighten the self-locking hex nut as it will restrict the wheel movement. Tighten large Kingpin nuts (9/16") as needed for ease of steering.



Step 4

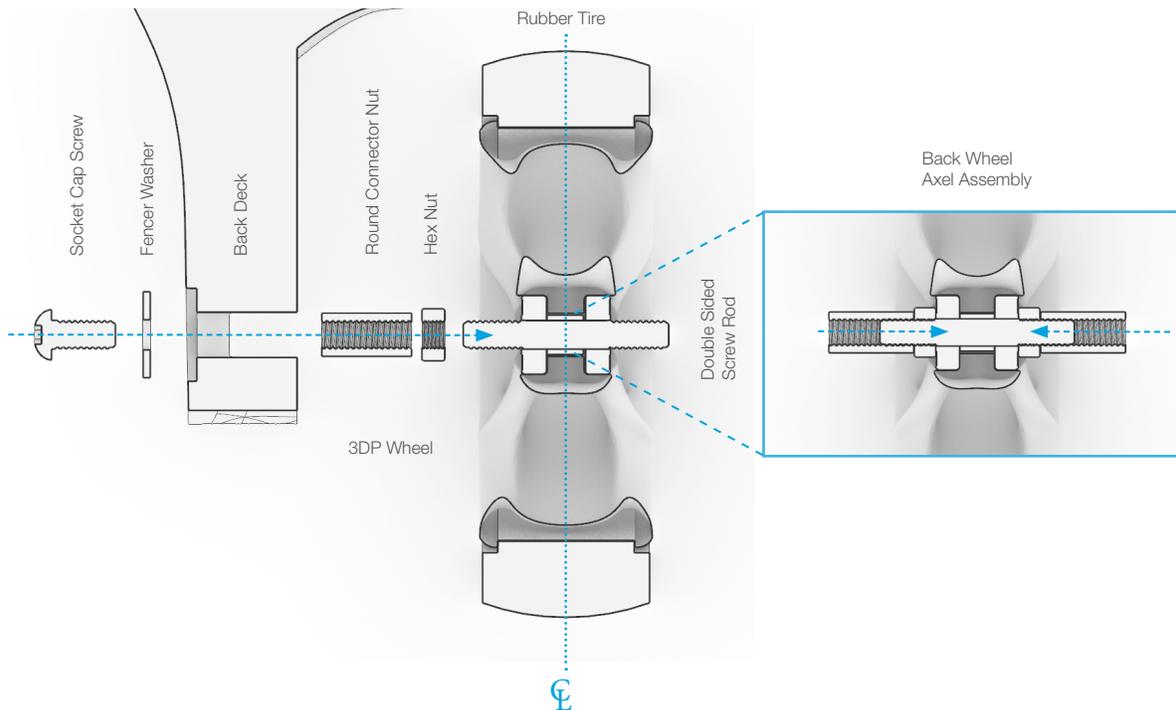
rear axle

Rear Wheel Assembly

Create the same wheel assembly as the front wheels (Rubber tire, 3DP wheel, bearings, spacer). Set this aside and screw a Hex Nut onto the Double Sided Screw Rod in such a way that the wheel assembly can sit in the middle. Then screw the second hex onto the opposite side securing the wheel in place. Next, screw the Round Connector Nuts onto both sides as seen in the zoom in below.

Notes

The Hex Nut can be challenging to place correctly at first along side the Round Connector Nuts. Use the jaw locking pliers and/or a clamp to secure the Round Connector Nuts into place.



Step 5

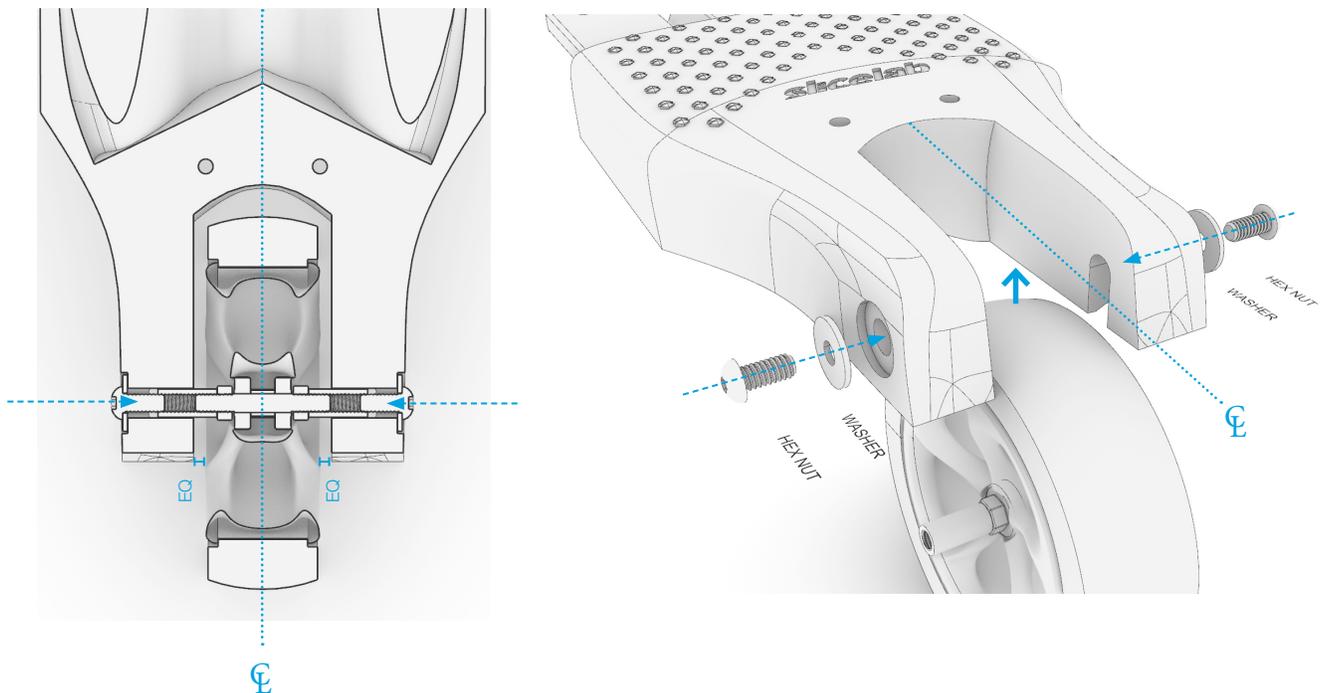
rear wheel

Rear Wheel Calibration

Take this assembly and forcibly press it into the slot found at the bottom of the Back Deck. Next, add the Button Head Socket Cap Screw with Fender Washer to each end, tightening them simultaneously while keeping the wheel assembly centered on the deck. Using an M8 Allen wrench to tighten, make sure the wheel can spin smoothly, too tight will bend/crack the 3DP.

Notes

Some sanding may need within the back slot of the part if it is too tight due to printing defects, shrinking or warping. Keep the rear wheel spinning while calibrating to ensure the axle is lined up correctly with equal gaps on either side of the tire.



Step 6

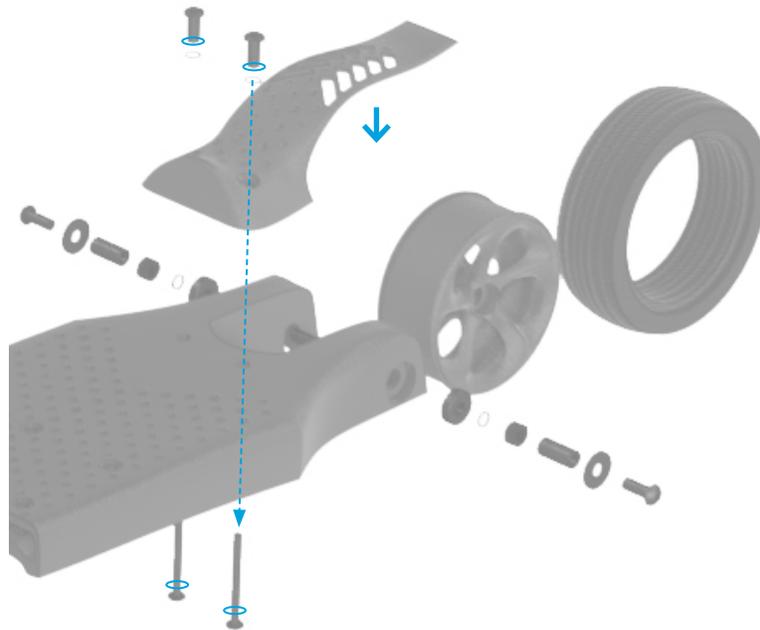
rear brake

Brake to Back Deck

Connect the Brake to the Back Deck half using (2) M6x55 Socket Cap Barrel Nuts. Make sure to insert female side first, this may require some light hammer like tapping on the ends as the hardware fits tightly within the slots. Use an M4 Allen wrench on either side to tighten evenly.

Notes

Slide 4 rubber O rings onto the top of the Socket Cap Barrel Nuts before putting them into the slots.



Step 7

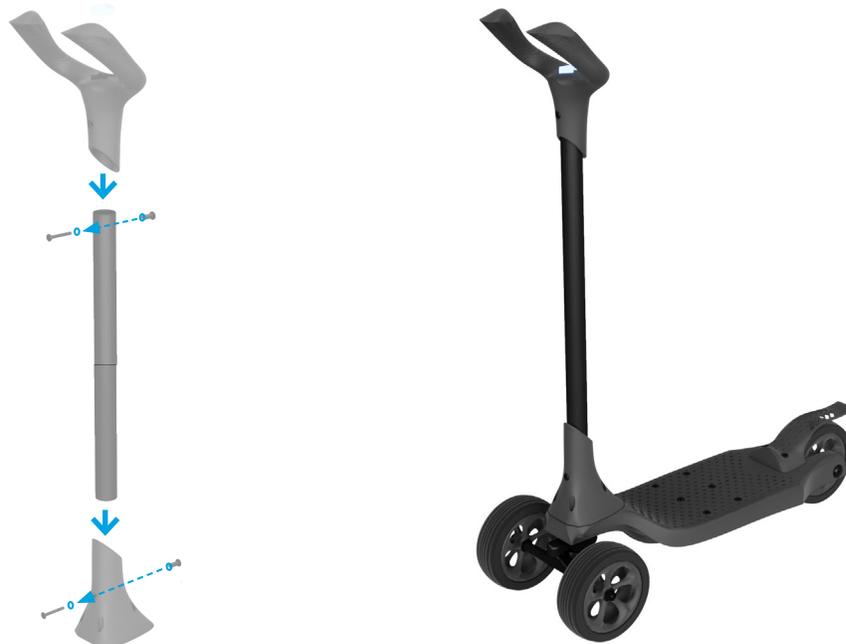
handlebar assembly

Referenced Parts

Cut the aluminum pipe down to the desired post length using a hack saw. Next, place the Handlebar and Stem Base onto the aluminum post. Next, mark the centers of the holes and drill the hardware holes. Lastly, connect the Stem Post to the Handlebar and the Stem Base using a M6x30 & M6x45 Socket Cap Barrel Nuts. Make sure to insert female side first, this may require some light hammer like tapping on the ends as the hardware fits tightly within the slots. Use an M4 Allen wrench on either side to tighten evenly.

Notes

When drilling into the shaft of the metal post, tightly secure the post onto a hard surface with proper clamps. If possible, use a drill-press for more accurate results. Make sure to use two separate drill bits for the different thicknesses of the socket cap barrel nuts. Reference the 3D printed part for which side is which.



Step 8

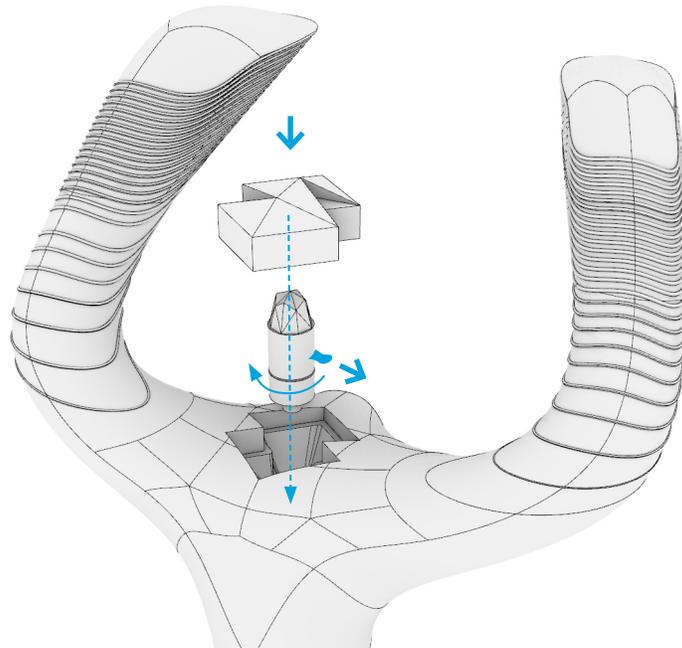
light assembly

Light to Handlebars

Before putting the light into the slot at the top of the handle bars, pull the plastic tab that activates the battery and twist the shaft clockwise to turn the light on. Next, fit the light and the clear Stratasys 'S' shaped piece snug into the form fit openings.

Notes

Light needs to be shut on and off while not in use to preserve the battery. Removing the light can be challenging pressed too deeply into the slot.



Bull Rider

common questions

FAQs

1. Do you really need the rubber O rings on all hardware

No, but they will provide additional cushioning on the 3D printed parts that could alleviate cracking issues

2. Does the height of the metal tube matter

Yes, the ergonomics of this scooter will work best when user grips the handlebars slightly below the waist

3. How tight should the trucks be for steering

Looser is better as it give a user more feedback and control as they steer and kick off, too tight may prove hard to balance while trying to lean into a turn.

4. Should I tighten all hardware to the max

No, most of the hardware will do it job at a reasonable level of tightness, no need to crank down on the metal parts especially considering they are impacting the 3DP pieces and could crack them.

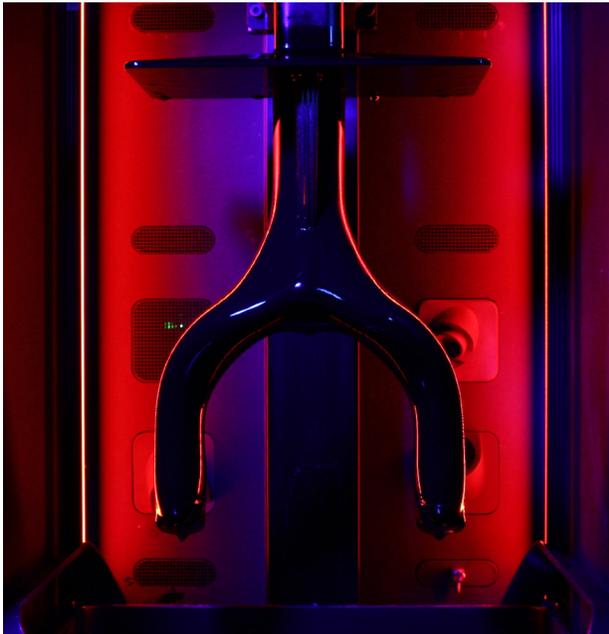
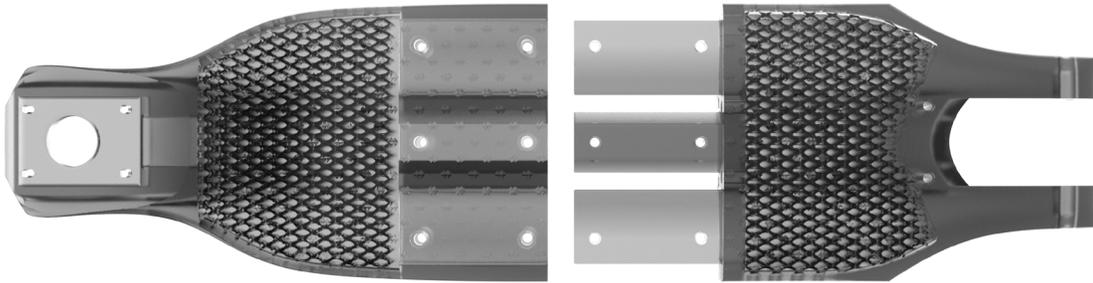


Bull Rider

3D print instructions

Print tips

The majority of the parts except of the handlebar light are printed out of Dura56. In the following pages, detailed print tips and instructions that highlight key elements needed to create successful prints for each part. All the print files mentioned can be found on [GrabCad](#)



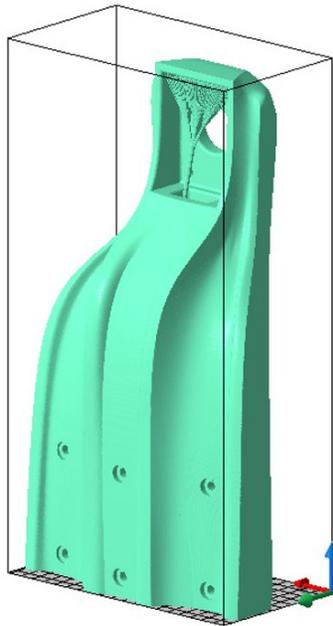
Bull Rider front deck

Print tips

Part volume: 1370 cc.

Material: Dura56

Be sure to add adequate resin to tray. It's hollow and latticed inside which will capture some resin, so you'll need to add more than the normal +200mL to make sure you don't run out. Suggest to start the print, then top off the resin during the 1st layer delay. Be sure to drain resin from interior back into tray for re-use and to avoid a mess. Print with conservative settings or use 8+ second delay time to account for large cross sections and get the best surface quality.



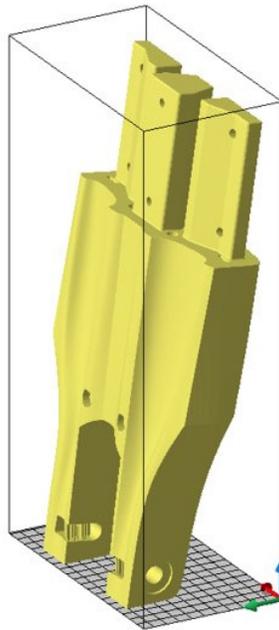
Bull Rider back deck

Print tips

Part volume: 1469 cc.

Material: Dura56

Be sure to add adequate resin to tray. It's hollow and latticed inside which will capture some resin, so you'll need to add more than the normal +200mL to make sure you don't run out. Suggest to start the print, then top off the resin during the 1st layer delay. Be sure to drain resin from interior back into tray for re-use and to avoid a mess. Print with conservative settings or use 8+ second delay time to account for large cross sections and get the best surface quality.



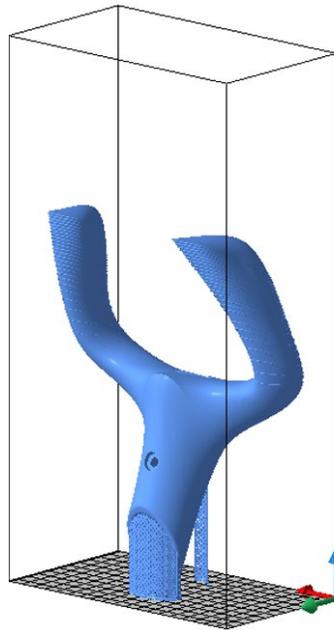
Bull Rider handlebar

Print tips

Part volume: 340 cc

Material: Dura56

Be sure to add adequate resin to tray. It's hollow and latticed inside which will capture some resin, so you'll need to add more than the normal +200mL to make sure you don't run out.



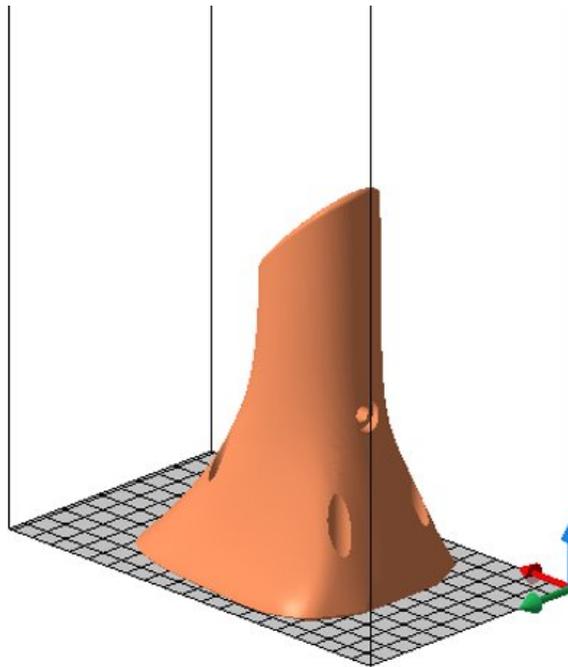
Bull Rider stem base

Print tips

Part volume: 314 cc

Material: Dura56

Print with Dura56 conservative settings, or Increase delay time to 10+ seconds, to account for large cross section and large unventilated volume, or re-support the part to alleviate the unvented volume.



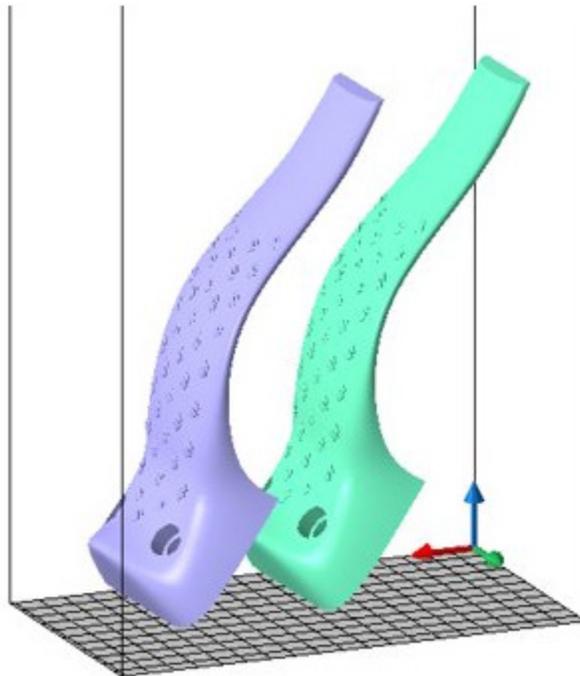
Bull Rider brake

Print tips

Part volume: 323 cc

Material: Dura56

Print with Dura56 conservative settings. Orientation of the brake can be changed to support the underside of the part that is not visible to the user.



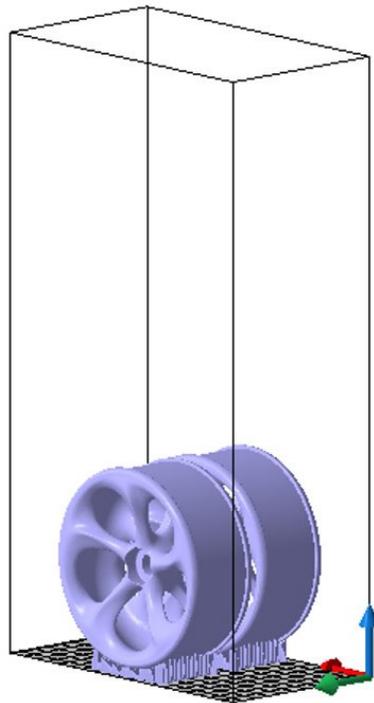
Bull Rider wheels

Print tips

Part volume: 374 cc

Material: Dura56

The wheels fit tightly next to each other and are stackable in Z direction as well with similar support in the case where 4 or 6 need to be printed at once. Make sure to remove as much support as possible as getting the rubber tire onto this surface can be difficult.



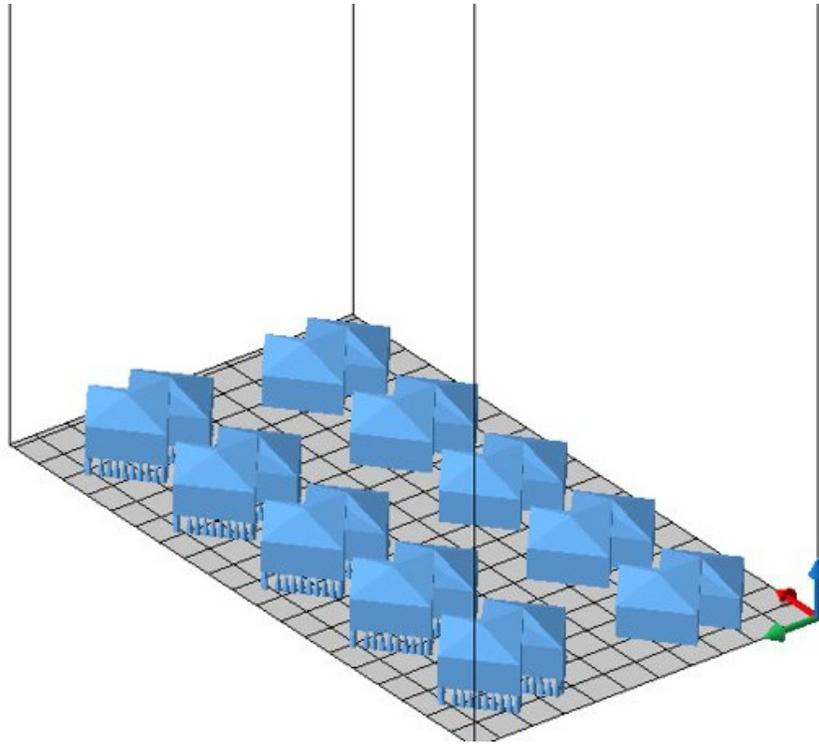
Bull Rider light

Print tips

Part volume: 374 cc

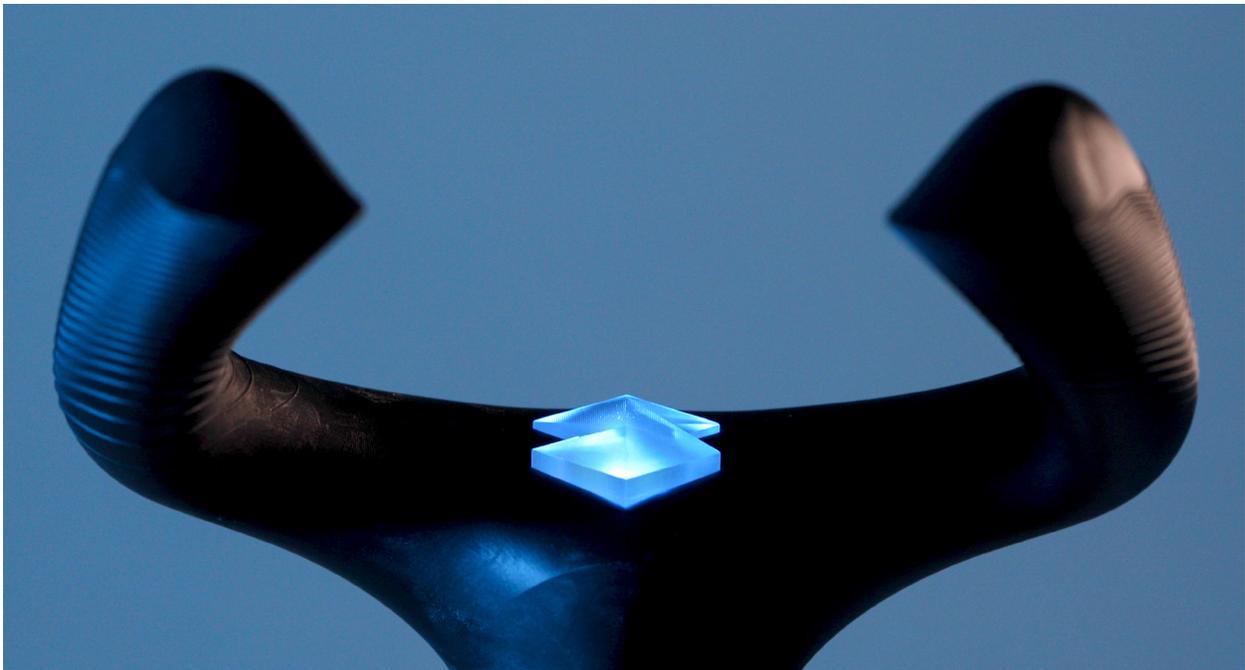
Material: IND405

10x LED cover. 5 of them are shelled and supported, the other 5 are solid and flat. Either will work, they just look different when assembled with the LED. Make sure to remove as much support without sanding too much unless a frosted look is desirable.



Bull Rider support

Please direct any assembly questions to Slicelab, the original designers of the scooter, at info@slicelab.com



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