



SimpleCore Geared Belted Z Axis



Ein

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updated 4. 6. 2024 | published 4. 6. 2024

Summary

This is a modification to the SimpleCore Legacy belted Z axis to add a gear reduction to prevent bed drop.

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I love the belted Z of the Simplecore, however, with the stock direct drive setup, the bed tends to drop like a rock, especially for larger builds when motor power is cut. To fix this, I've designed new motor mounts that add a 4:1 gear reduction as well as tool-less tensioning top idlers.

I've also included a modified version of the stock bed carrier that adds ribs to provide better grip on the belts.

I printed with my usual Voron spec settings in ABS. 5 shells, 40% infill, no supports.

All STLs import in the best orientation for printing (imo).

BOM:

Motor mounts:

Item	Quantity	Notes
CNC 80t GT2 pulley	3	Optional. I've included the Voron printable 80t which should work fine though I have not tested it myself.
20t 6mm width GT2 pulley 5mm id	3	Optional. Only needed if using the printed 80t pulley's.
20t 6mm width GT2 pulley 5mm id	3	
20t GT2 pulley 6/9/10mm width 5mm id	3	For the Z drive belt. The included spacer files are designed for 9mm Powge style pulleys.
GT2 Belt 6/9/10mm	3-4 meters	Adjust for your desired Z drive belt width.
Closed loop GT2 188mm belt	3	
F695-2RS bearing	6	
5mm D-Shaft 50-60mm length	3	
M3x10mm SHCS	6	
M3 nylon lock nut	3	
M3x16mm BHCS + washers	6	
M5x10mm BHCS	12	

Top Idlers:

Item	Quantity	Notes
GT2 Idler pulley 6/9/10mm	3	Adjust for your desired Z drive belt width.
M5x20 BHCS	3	

M3x20 External hex head	3	May be annoying to source. Hard to find online in quantities <50. I had better luck sourcing them locally from a hardware store.
M3 Nylon lock nut	3	
M5x10 SHCS	6	

Considerations

1. Using the stock SimpleCore feet, the front two Z assemblies will need to be slid back ~6mm. This isn't an issue for me on the 330 sized build but hasn't been tested on smaller sizes yet. Please let me know if you do.
2. Before moving to the new top mount tensioners, I secured the Z belts at the bed carriages by running them through the center hole and folding them back towards themselves, then zip tying them to itself to create a loop. With the new idlers, there isn't much room to do that on the top. Instead I've left the bottom loop and folded the top end down and zip tied it along with the bottom loop.
3. With the 4:1 ratio I'm no longer experiencing any bed drop, however I'm using a PCB heater with a glass plate and a 0.5mm PEI sheet on top of the stock bed T. This is more than likely lighter than a MIC6 build plate. At some point I will be moving to an aluminum bed and silicone heater. I can test then to see if it will hold up with the current ratio unless someone gets to it first. It should be relatively easy to adjust the motor mount to space the motor a little bit further away so that adequate tension on a 16t pulley (instead of the 20t) upping it to 5:1.

UPDATE: I've since upgraded to a 300mm Mandala Roseworks Magbed with a silicone heater. When the motors are powered off I still don't experience any bed drop.

Tips

- A little dab of super glue on the external hex bolt in the tensioner where it meets the carrier was really helpful for keeping it in place and keeping it straight.
- I found that an M3 nut in the tensioner didn't provide enough resistance and was worried that it would come loose over time. On the other hand a brand new Nyloc nut was a bit hard to turn. To alleviate this, I ran an M3 bolt through it a few times with a drill to "clearance" it a bit.
- The motor 188mm belt tensioning was inspired by the Voron M4. Put the M3x10mm in the bottom left in first and tighten it down as far as you can while still being able to rotate the motor. Loosely put in the

two M3x16mm bolts and install the 188mm pulley. I used two M3 washers on the M3x16mm bolts as when tensioned, I've found that a single washer will deform. Then just twist the motor body to apply tension to the belt and secure the bolts.

Attribution

- As always, thank you to Rolohaun for the original SimpleCore design and his awesome work in the community. <https://github.com/rolohaun>
- Thanks to the Voron team and specific to this project the Mobius 4 extruder. <https://vorondesign.com/>

Model files



32mm_cnc_80t_spacer_x3.stl



25mm_pulley_spacer_x3.stl



z_tensioner_carrier_x3.stl



z_tensioner_body_x3.stl



geared_z_motor_mount_x2.stl



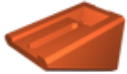
geared_z_motor_mount_mirrored_x1.stl



voron_80t_gear_x3.stl



z_tensioner_wheel_x3.stl



sc_toothed_z_bed_mount_mg9_mg12.stl

simplecore-200-geared-z.step

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