

Y-Axis CNC Adapter for Paulimot/SIEG SX3L drilling/milling machine

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Summary

Y-Axis CNC Adapter for Paulimot/SIEG SX3L drilling/milling machine so that the Y axis can be moved by a CNC software

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I recently turned my Paulimot/SIEG SX3L drilling/milling machine into a CNC version of it and although I attempted to mill all adapter plates out of aluminum, I got lazy and built the Y-axis out of PLA and now share the result here.

GENERAL STUFF

I designed the adapter plate so that no part of the milling machine has to be adapted and a dismantling of the CNC function is always possible - this is why the adapter is that large, since I built it around the existing shaft and used existing threads. The adaptation of the adapter to the guide rails of the milling machine's Y-axis (the triangular grooves on the sides) was tedious, but in the current design the range of movement of the Y-axis is unrestricted. I even intended to reattach the crank handle on the back of the stepper driver to still be able to fully manually use the milling machine, but after some iteration I refrained from doing that - I just don't need it anymore - but theoretically, it's possible with this design.

PARTS TO BUY

The coupler is designed to fit an 8mm shaft-hub joint. Specifically, I used the following stepper motor from Stepperonline:

https://www.amazon.de/gp/product/B091C37FJ2/ref=ppx_yo_dt_b_asin_title_o00_s00?ie=UTF8&psc=1

and this 20:1 planetary gear, since a fully extended X and Y axis might cause the stepper driver to lose some steps sometimes (a 5:1 gear also does the job, but the stepper driver has to turn quite slowly then):

https://www.amazon.de/gp/product/B0BPGPNDMG/ref=ppx_yo_dt_b_asin_title_o00_s00?ie=UTF8&psc=1

I designed the spacer sleeve to be threaded on the Y-axis shaft of the milling machine. This is the only part that may have to be adjusted in length to the individual shaft-hub joint of your choice. For myself, I printed this spacer so that about 2mm spacing remains between stepper motor/gear and 3D printed part so that I can easily finetune the pressure on the thrust bearing of the axis and find the optimum between too much friction and too much clearance/backlash. I then fixed the ideal position with loctite. Note: For the abovementioned planetary gear, the shaft has to be shortened a bit, since I wanted the adapter part to be as short as possible (given the abovementioned constraints).

Besides that, you just need four 120mm M6 and two 80mm M6 hex socket screws with respective nuts.

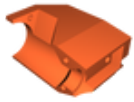
PRINT SETTINGS

I printed the parts with 0.4 nozzle and a wall line count of 8 (!) to be on the save side having a sturdy enough adapter for the loads it has to take. An 0.8 nozzle, even with an extrusion width of 1.6mm would do as well since this was my setting for the prototypes I built to get fast results.

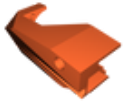
MISC

For the interested ones: I use the openbuilds ecosystem for this build and love it - although the system is actually too undersized for this type of a CNC milling machine - but with the 5:1 planetary gearboxes (on each axis) and the correct acceleration and maximum speed settings it works reliably.

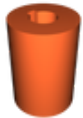
Model files



y-axis-adapter_r.stl



y-axis-adapter_l.stl



coupler.stl



spacer-sleeve.stl

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