Grating holder for “Extrusion“ version of NA1

Feb. 3, 2021 Jerry Foote

There are 5 printed parts to the Grating holder: Base, geared stage, motor gear, grating mount and an optional “dummy” bearing.

Additional parts:

4mm x 2mm N52 disk magnets (6 each) (ebay)

3/8 flat washer 0.438 ID x 1.0” OD x .075 Zinc Plated flat washer from my collection

28BYJ-48 stepper motor

0.625” OD x 0.25” ID ball bearing if used

4-32 x ¼ screw

Gap filling CA glue

The “dummy” ball bearing can be printed and used in place of an actual ball bearing for testing.

Some of the printed parts need particular orientations when printing:

Geared stage: orient with the 4 magnet holes on the bed use support touching the bed.

Grating mount: orient with the bottom (“D” shaped hole) up and use Tree support.

Be sure and test fit all parts before gluing.

After printing the geared stage make sure that the side with the 4 holes is very flat by lightly sanding on a flat surface. If you use the Dummy ball bearing put this in before sanding.

Make sure that the washer fits the opening in the base. Washer specs are pretty loose and some trimming of the hole might be needed. The washer face should be just slightly above the base part. Washers are stamped and the top surface has rounded edges. This surface should placed down into the base with flat side up. Also before gluing the washer in place check that the bottom is flat without burs. Test that the geared stage fits on the base flat without wobble, sand flat where necessary. The washer is glued into the base with a few drops of the CA glue.

Installing the magnets is tricky as they have a love/hate relationship. For the grating holder magnet make sure it fits and then put a drop of glue in the hole and press home. Take another magnet and let it find its mate in the grating holder you just glued. Take a felt tip pen and mark the side that is up. Now add a drop of glue to the geared stage magnet hole and put the marked side of the magnet into the hole.

Place the four magnets on the washer. Push them together side by side and make sure that one doesn’t repel from another. After they are all next to each other mark the top surface of each magnet. One at a time glue each magnet into the geared stage with the marked side up and push it home. Do the same for the other three magnets.

The motor is mounted from the bottom of the base. I used only one screw (4-32 x ¼) to hold it in place during tests. Place the motor gear on the motor once installed.

In the final application the motor gear will need to be changed to accommodate the thickness of the mounting plate…TBD.

Performanc:

One step of the motor results in 0.2 degrees of grating rotation. Any position is repeatable (+/- .01 degree) provided that the direction of approach is always the same.