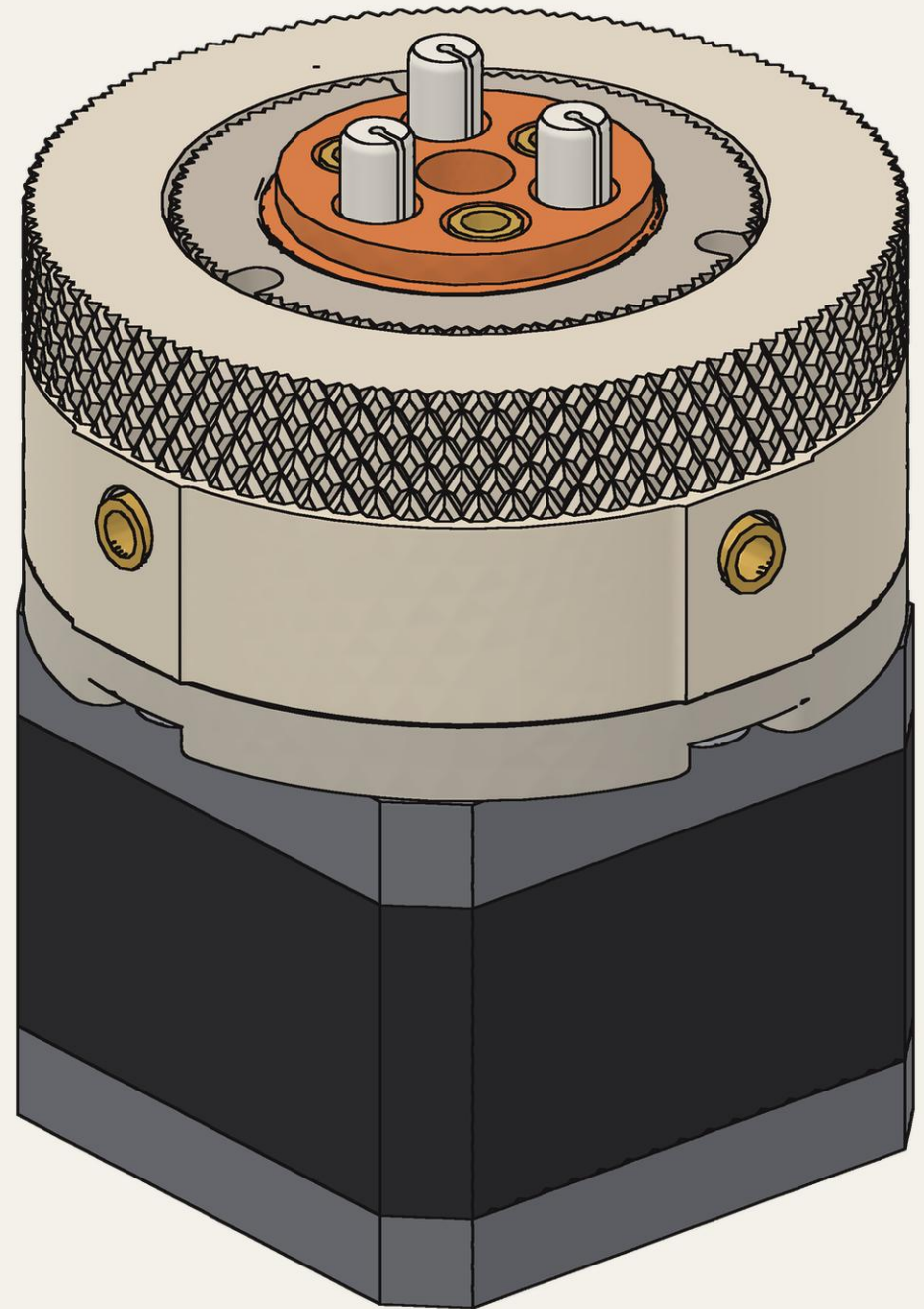


LEGO-STYLE BUILD MANUAL

RINNEGAN DRIVE

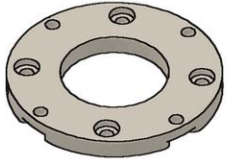
HDP30 • Rev C • 30:1 harmonic drive
NEMA 17 • printed in PLA • ~\$4 hardware
10 steps



WHAT YOU NEED

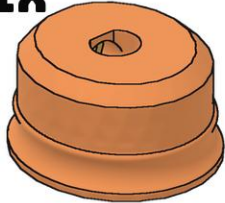
PRINT • PLA, EVERY PART • WE USED A P1S: SCARF SEAM ON, ARACHNE WALLS, TREE SUPPORTS • REMOVE SUPPORTS + CLEAN MATING FACES

1X



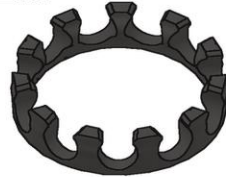
interface plate

1X



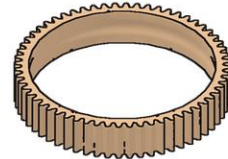
wave generator

1X



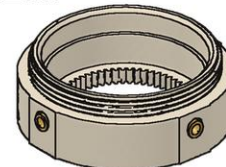
ball cage

1X



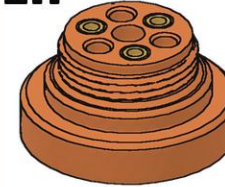
flexspline

1X



circular spline

1X



output spline

1X



inner preloader

1X



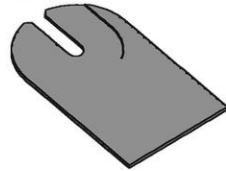
outer preloader

3X



shear pin

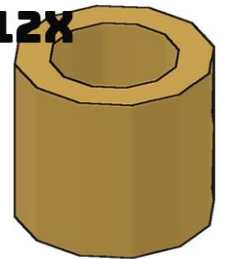
1X



alignment tool

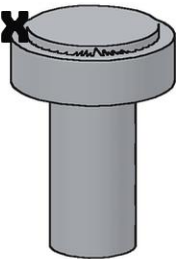
HARDWARE • ~\$4 PER DRIVE

12X



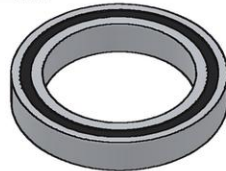
M3 heat-set insert

8X



M3 x 6 button head

1X



30x42x7 bearing

11X



5 mm steel ball

1X



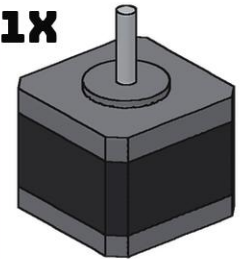
M3 set screw

1X



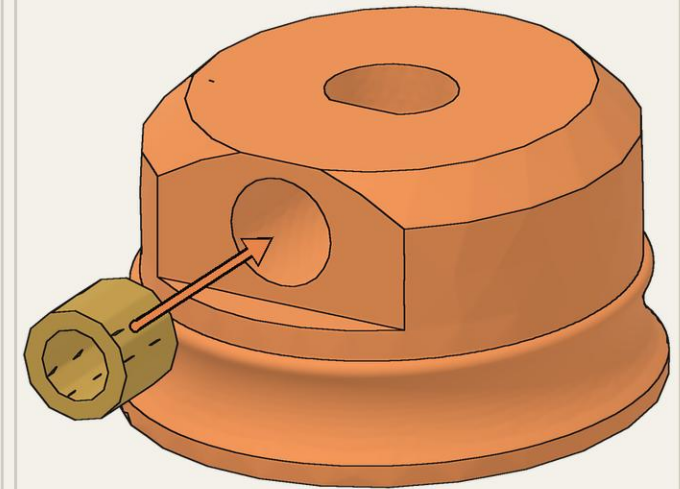
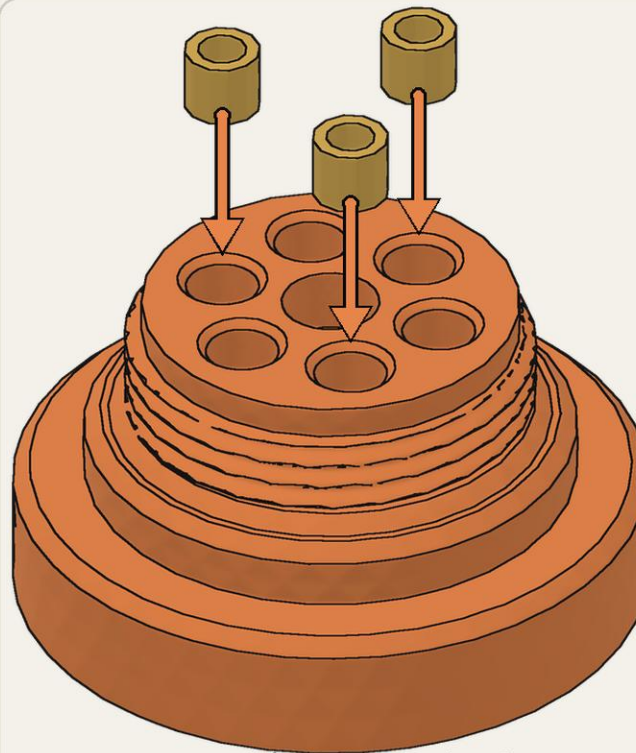
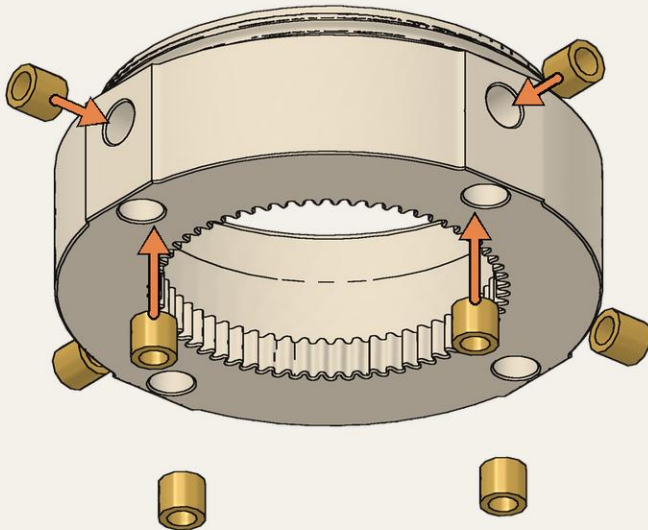
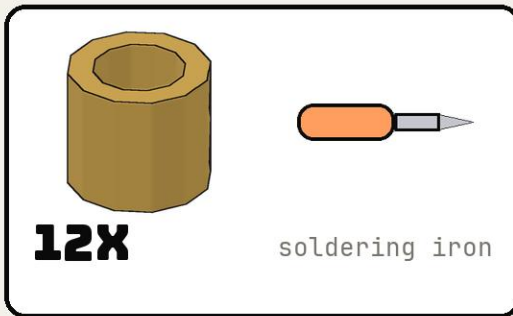
Super Lube (or Aquaphor)

1X



NEMA 17, 5 mm shaft

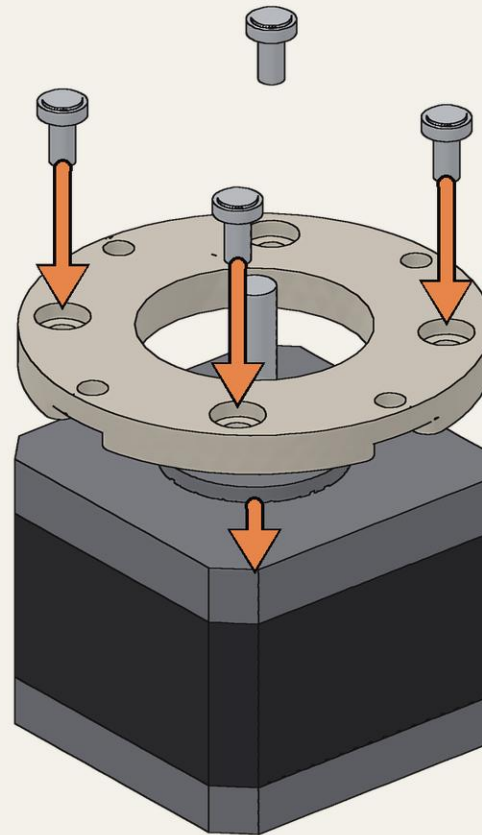
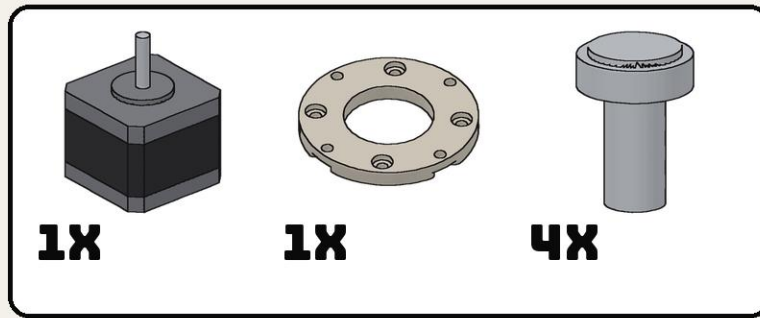
1



HEAT-SET INSERTS

Press 12 M3 inserts in with a soldering iron: straight and flush.

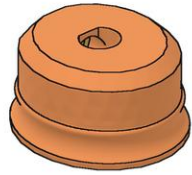
2



INTERFACE PLATE

Bolt the interface plate to the NEMA 17 with 4 M3 screws.

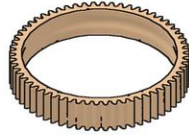
3



1X



1X

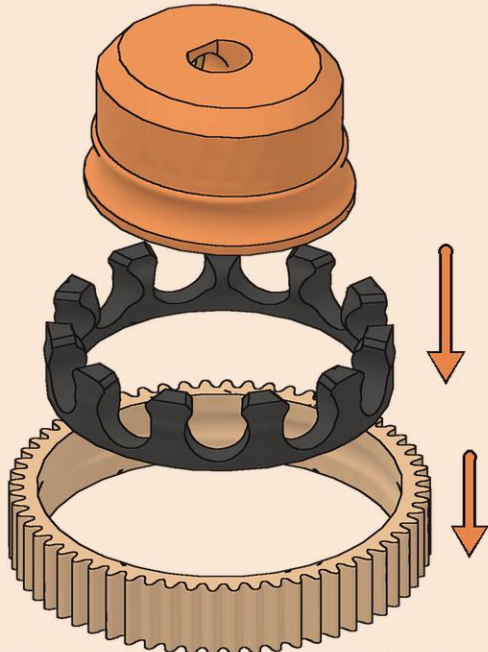


1X

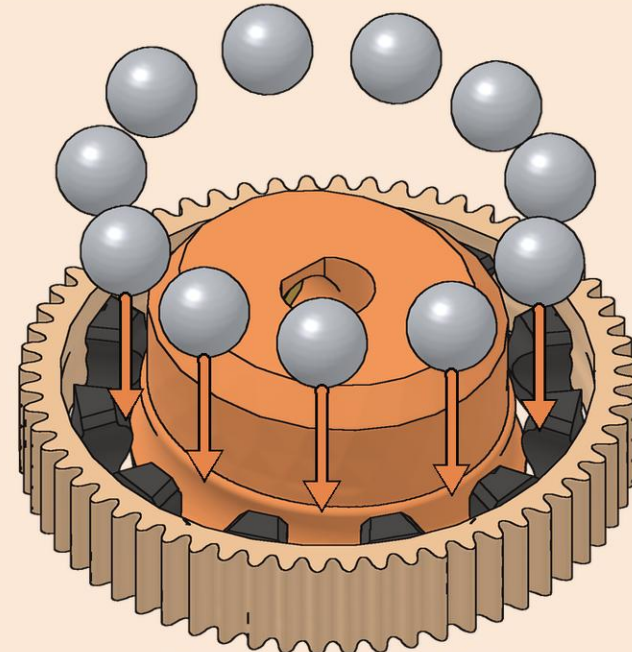


11X

SUB-ASSEMBLY



wave generator into cage, cage into flexspline

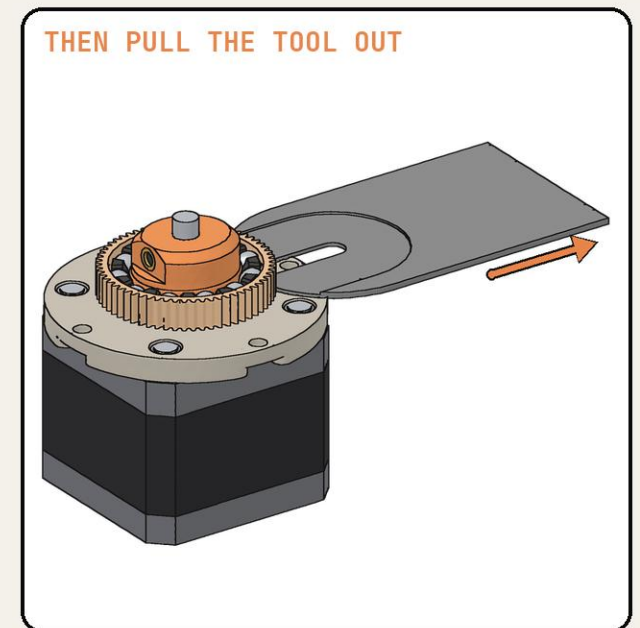
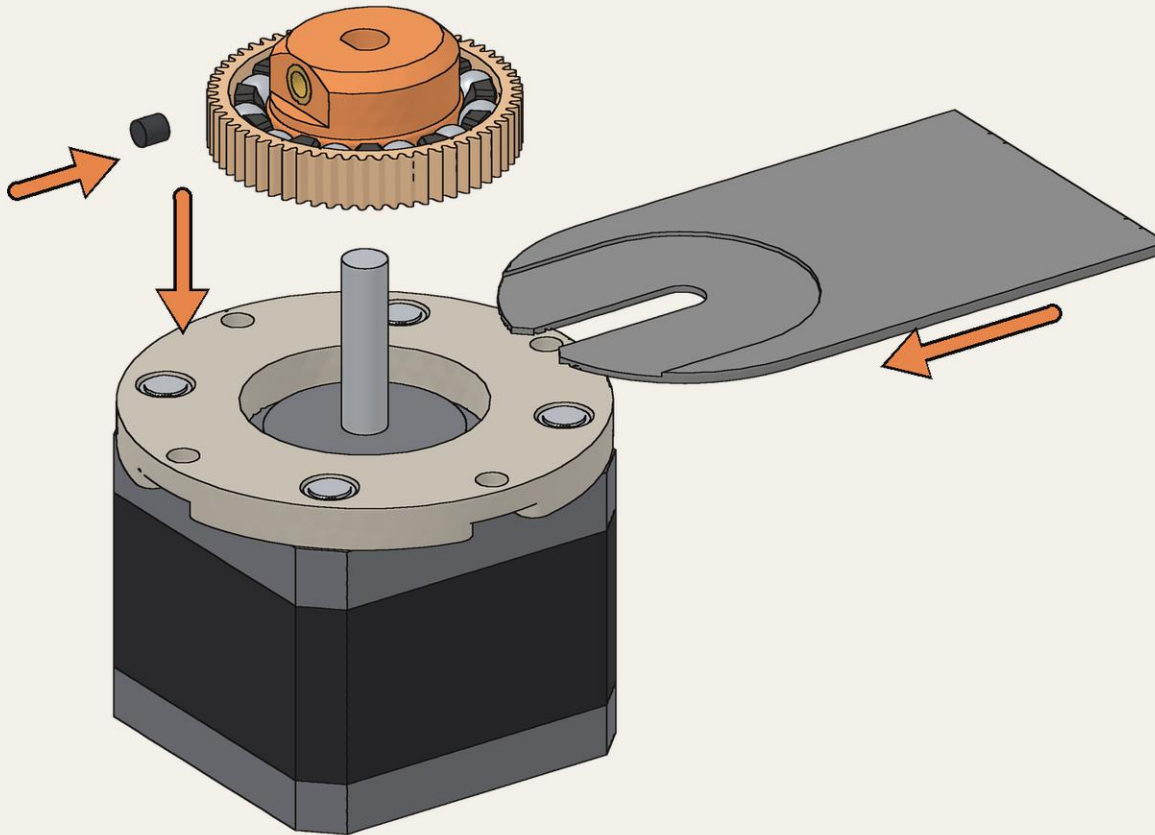
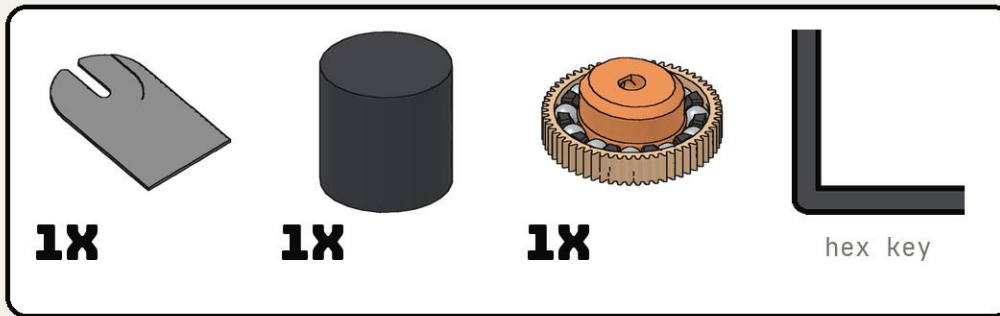


drop in the 11 balls

FLEX BEARING

Wave generator into the cage, cage into the flexspline. Then drop the 11 balls in from the top.

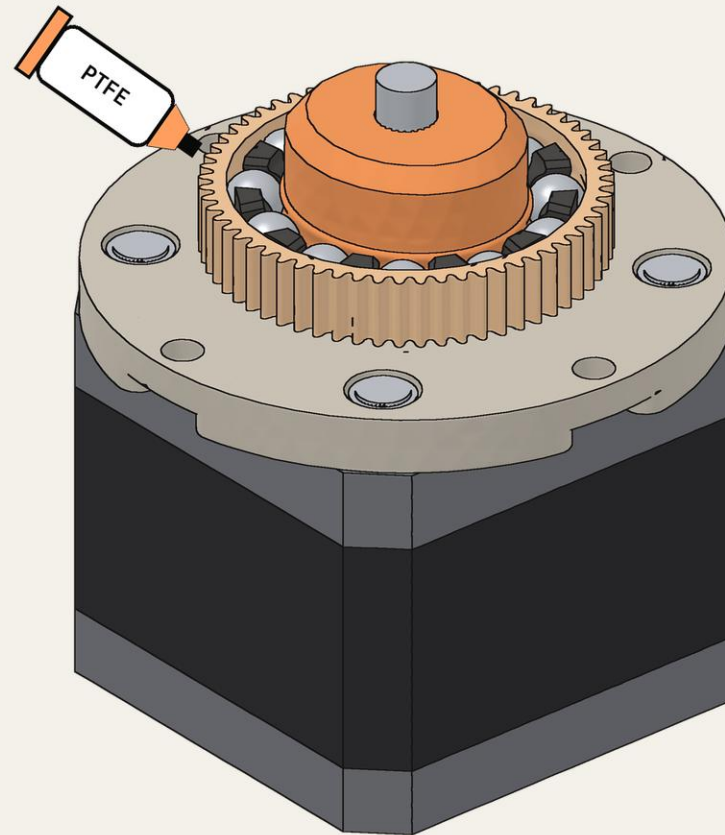
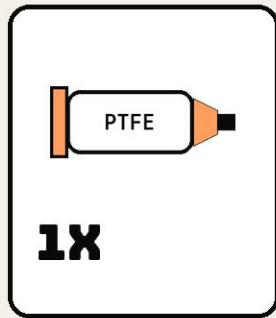
4



ALIGNMENT TOOL

Slide the tool onto the plate, drop the flex bearing onto it, tighten the set screw.

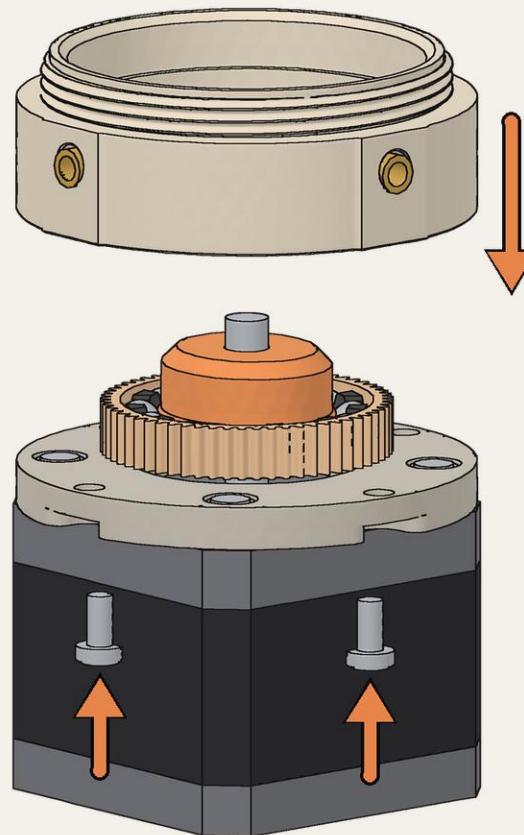
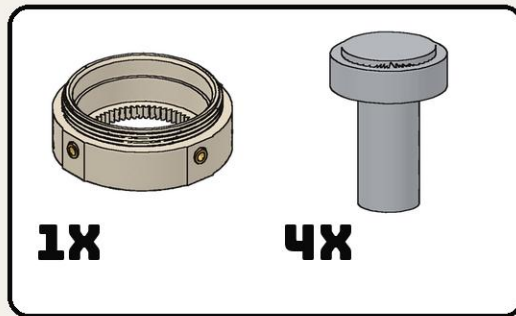
5



GREASE

Work Super Lube PTFE grease into the flexspline teeth and over the balls. In a pinch, Aquaphor works too.

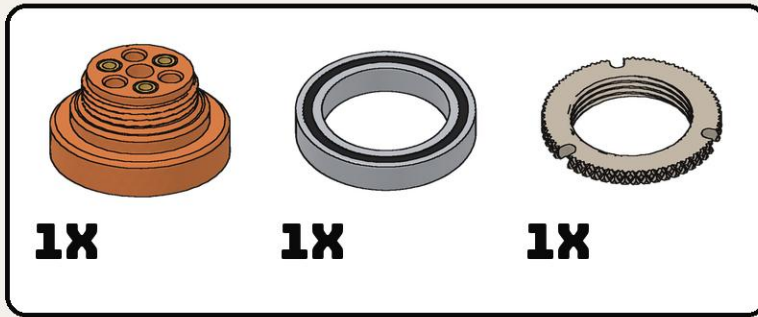
6



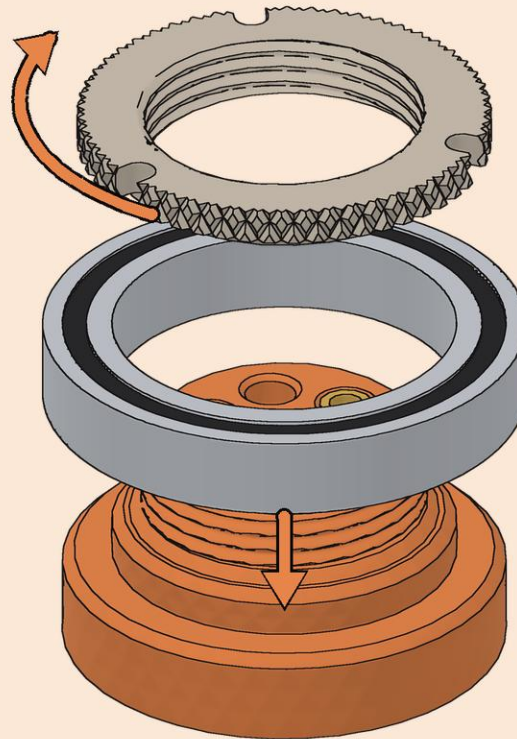
CIRCULAR SPLINE

Slide the circular spline over the flexspline. 4 M3 screws from underneath.

7



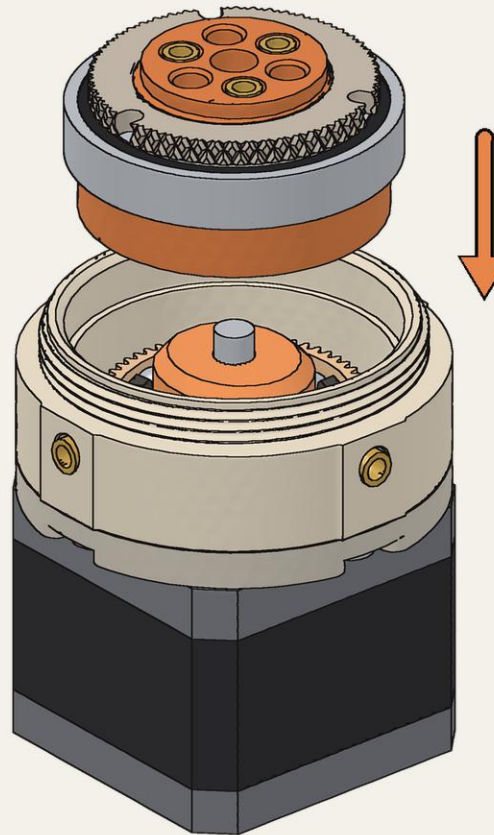
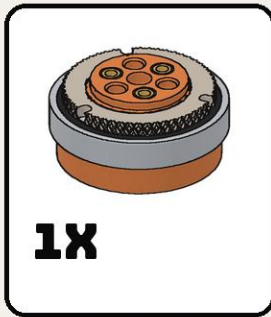
SUB-ASSEMBLY



OUTPUT STACK

Bearing onto the output spline, then thread the inner preloader down onto it.

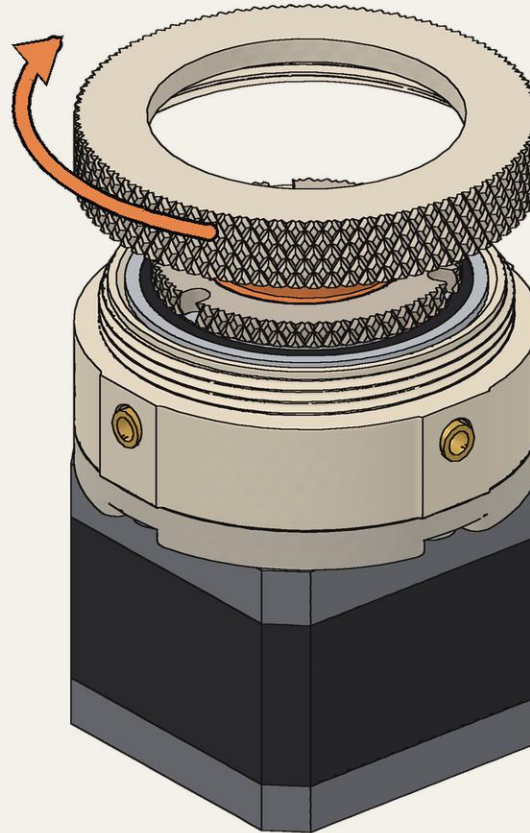
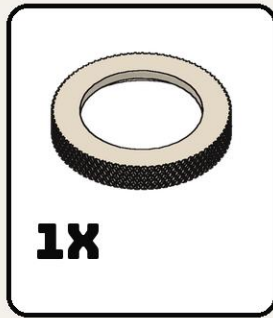
8



DROP IN THE STACK

Lower the output stack into the circular spline. The teeth mesh with the flexspline.

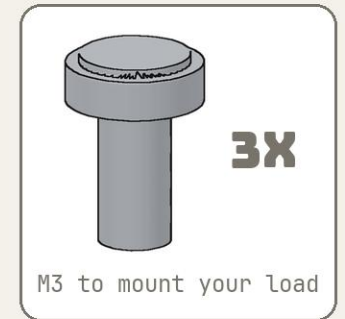
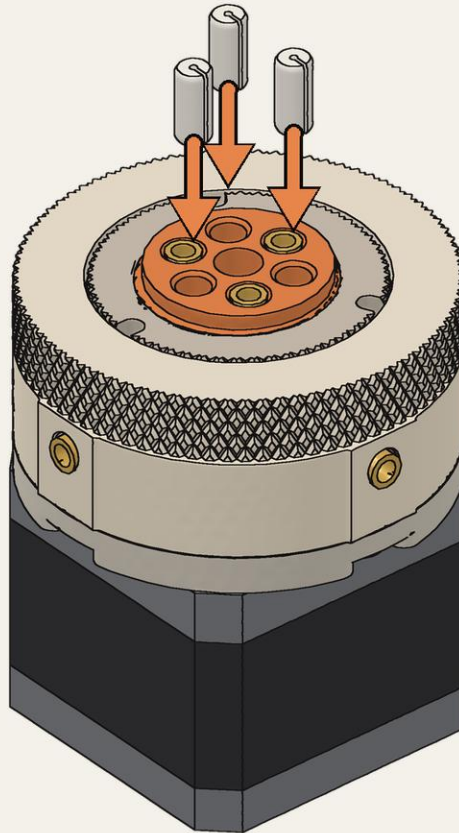
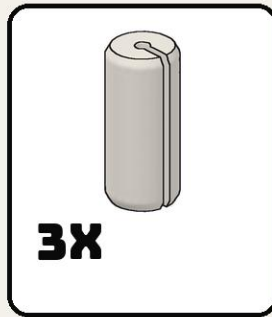
9



OUTER PRELOADER

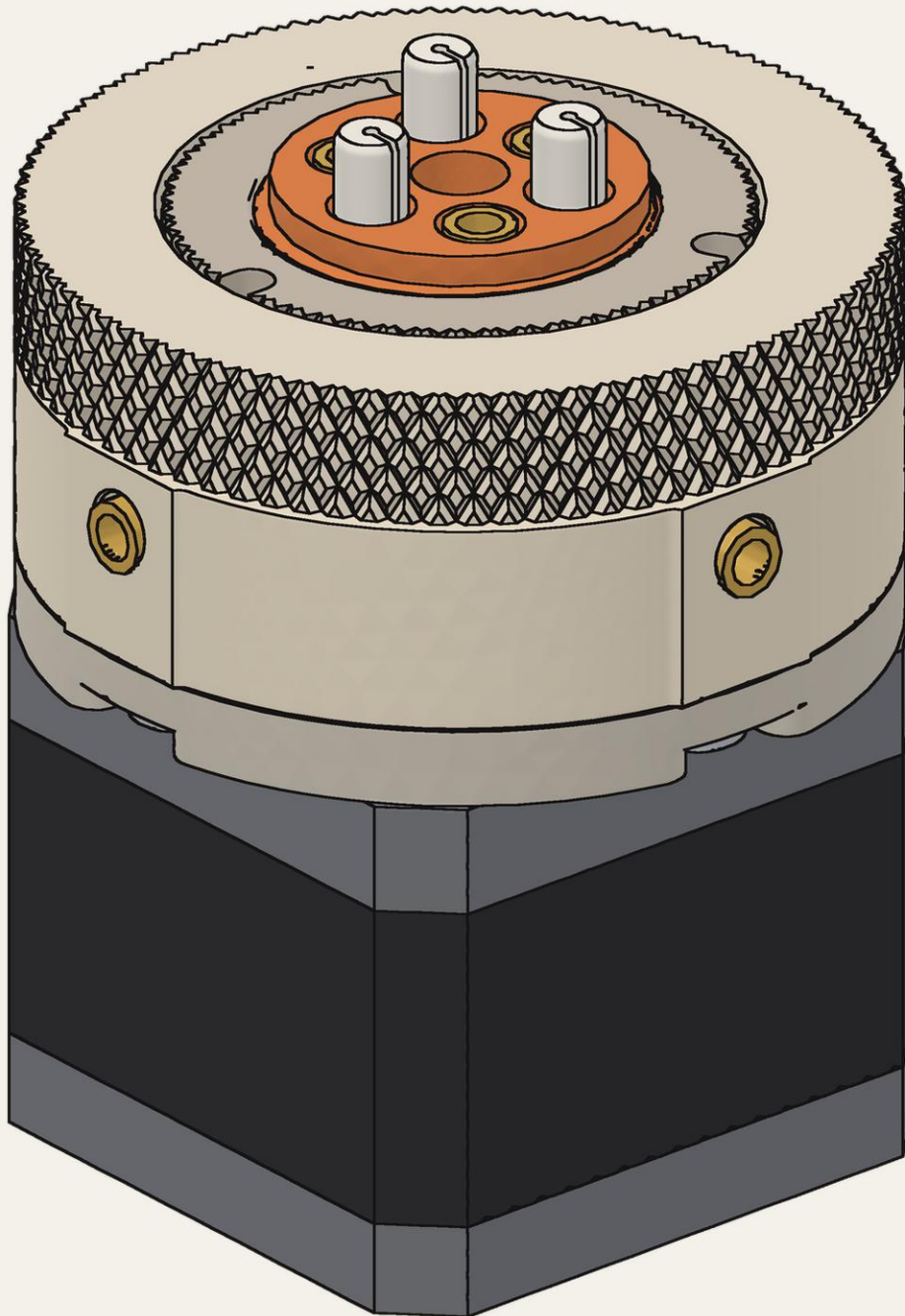
Thread the knurled outer preloader on, hand tight. Preload is the main tuning knob.

10



SHEAR PINS

Press the 3 shear pins into the output. 3 M3 bolts in the inserts mount your load.



DONE.

30:1

reduction ratio.

< 1.3 N·m

recommended operating torque. Keep it under that.

Free

test data, CAD and the BOM are on GitHub (github.com/robotics/hdp30) and on robotics.web.app.