Open Ball V1 (Ball vise system)

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VIEW IN BROWSER

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Summary

An easy to make ball vise with virtually infinite uses.

Hobby & Makers > Tools

Tags: vise

3/04/2024: Made some updates to the build instructions including parts lists and printing advice. Waiting on better turntable in mail.
7/04/2024: Still waiting on turntable, updated parts list. Updated model and build guide ETA 11/04/2024
13/04/2024: Released version 1.5 including a new turntable and an XL base, which I have chosen to upload as a separate model to keep this page less confusing.
This update includes the new/ final turntable that was the main holdup from v1. Parts under the “New turntable” folder. Also included several community suggested changes, see video for details.
14/04/2024: Updated with amazon links and uploaded 3d printable coupling nuts as some people had trouble sourcing. Fixed the lock cover being m4 instead of m3, only part to reprint is the small “Lock cover m3”.
22/06/2024: Updated with STEP file for v1.5
16/10/2024: Updated with a new bearing link that shouldnt run out of stock.
Sometimes prints feel like a solution in search of a problem. This time, thats not the case.

Ball Vise's have been used by engravers for at least a century. Even import models are expensive, and DIY options often require obscure hardware or the ability to cut a bowling ball in half. If this doesnt appeal to you, than maybe Open Ball will. Requiring no tools outside a printer and the ability to mix concrete, Open Ball is cheap and easy to make.

Quick Features:

-A sturdy concrete filled worksurface with 9 m8 mounting points for a variety of work holding. The weight of the concrete provides a stable worksurface with no need to bolt it to the bench.

-A locking turntable with indexed holes and a quick change dovetail system for half a dozen work holding options

-An optional XL base to allow for addons such as helping hands, hand rests, lights, and parts holders

-Open source!

Video with build instructions for the vise:

Parts are metric but the design is open source and changing to imperial should be a simple task. In my experience, though yours may vary, metric bolts have an imperial equivalent that should work. Consult this chart for more:

(chart goes here)

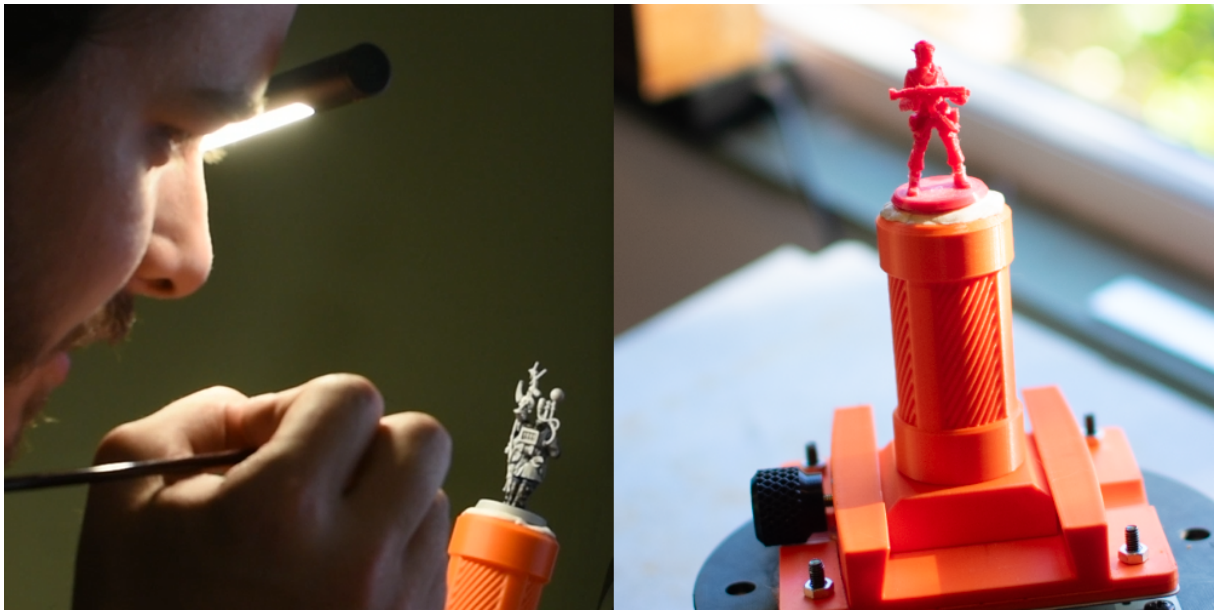
Parts list and build guide at the bottom.

****most pics show the outdated V1 base with old turntable and no indexing points****

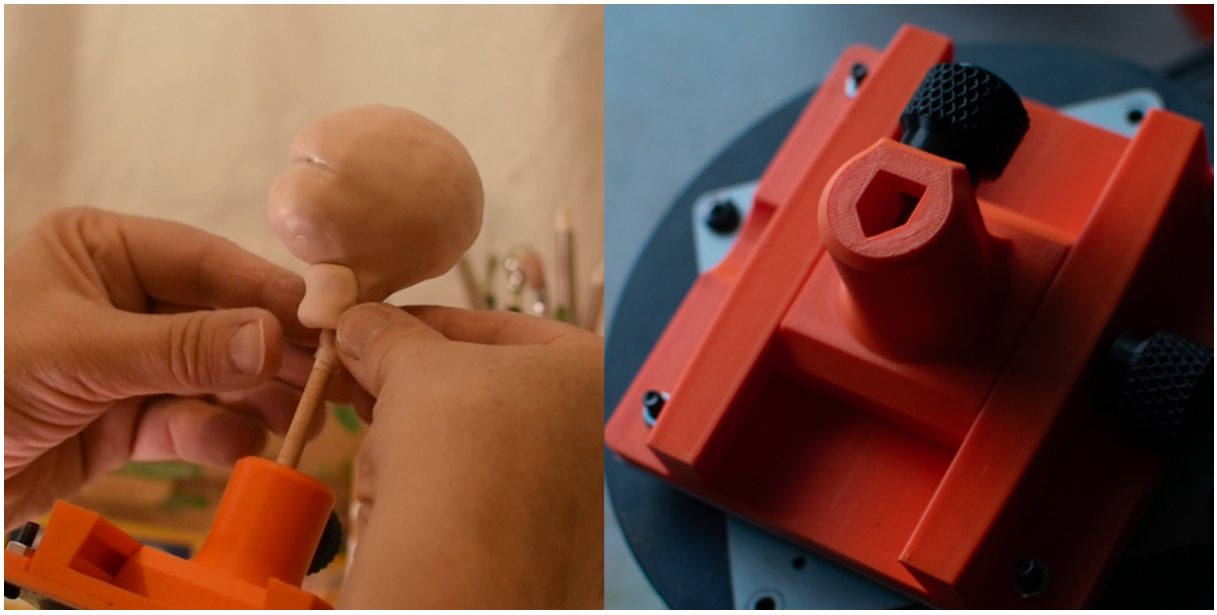
All work holding options mount via a quick change dovetail. Current work holding options include:

A Fractal and non fractal vise. These are the same Vise's used for my tapping arm:

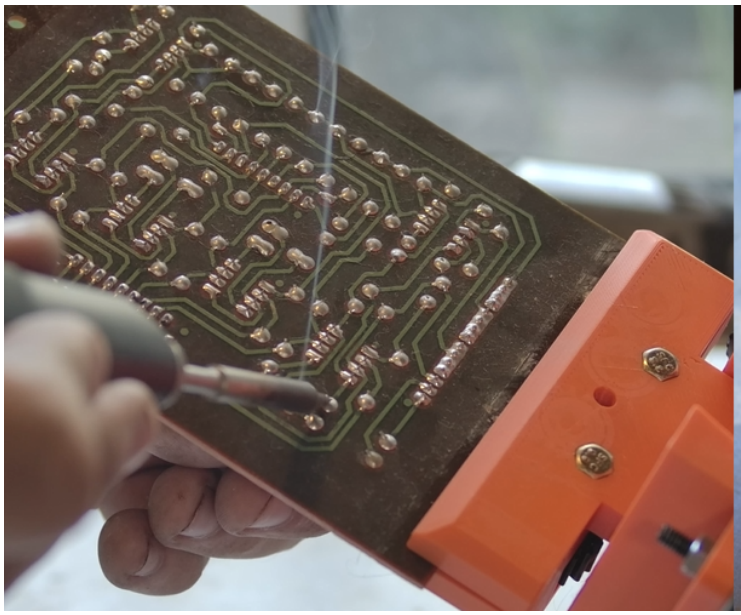
A Painting handle for Minis.

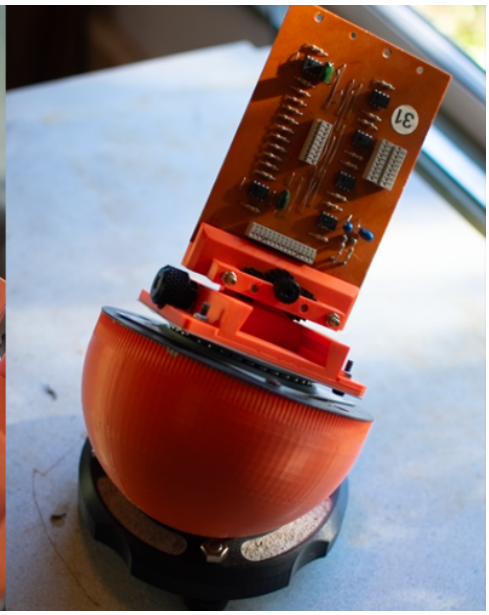


A round stick holder for things like sculpting:

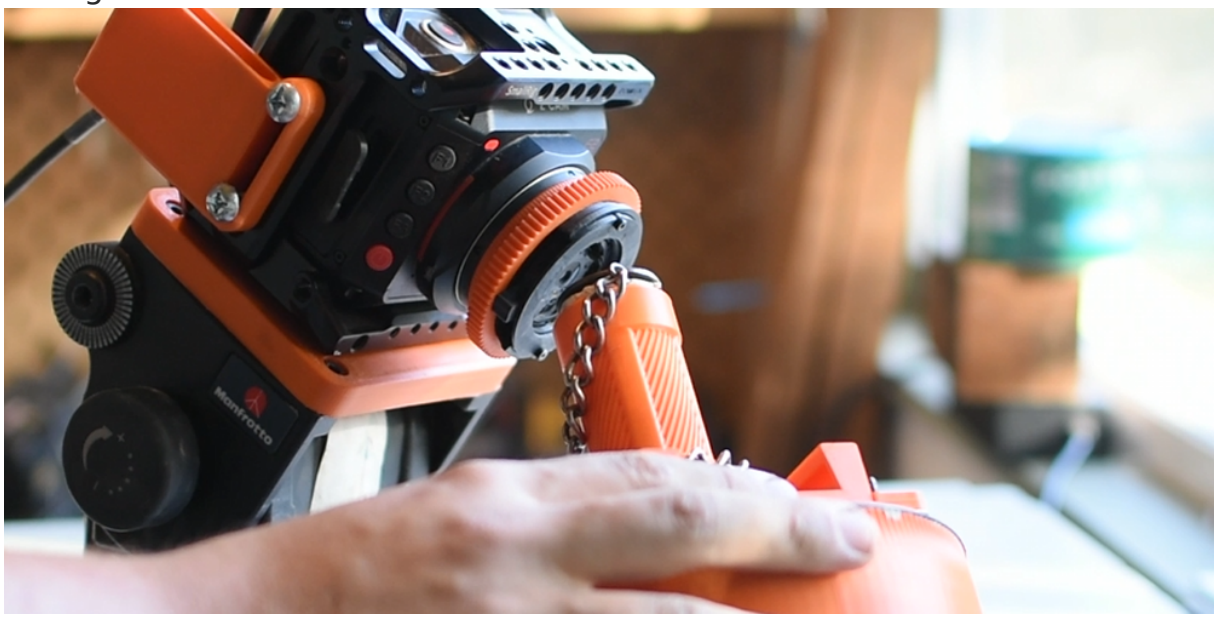


A PCB vise, or anything flat.





Another use that I haven't made any specific attachments for yet, but is one of, for me, its most useful features is for macro video work. It is about the most ideal system I've used, and the turntable is easily smooth enough for macro video work.



A plate adaptor to mount Squinn's PCB vise. Download most files from the original source, the adaptor is found here.

The XL base is an alternate base I developed to allow for adons like helping hands, parts bins, hand rests and more to augment the ball.

I have opted to upload it elsewhere since this page is a long enough scroll as is. See:

https://www.printables.com/model/842020-open-ball-xl-base

Im really happy with how this project turned out and am excited to see what the community thinks of it.

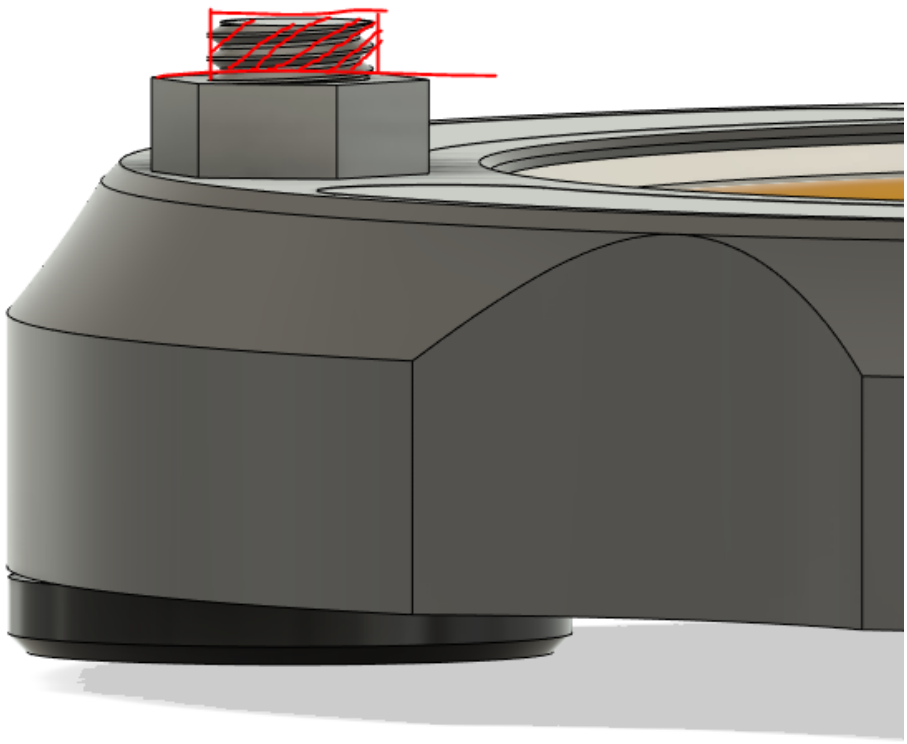
Parts:

The Ball:

-16 m8*10mm bolts

-1 m8*65mm bolt

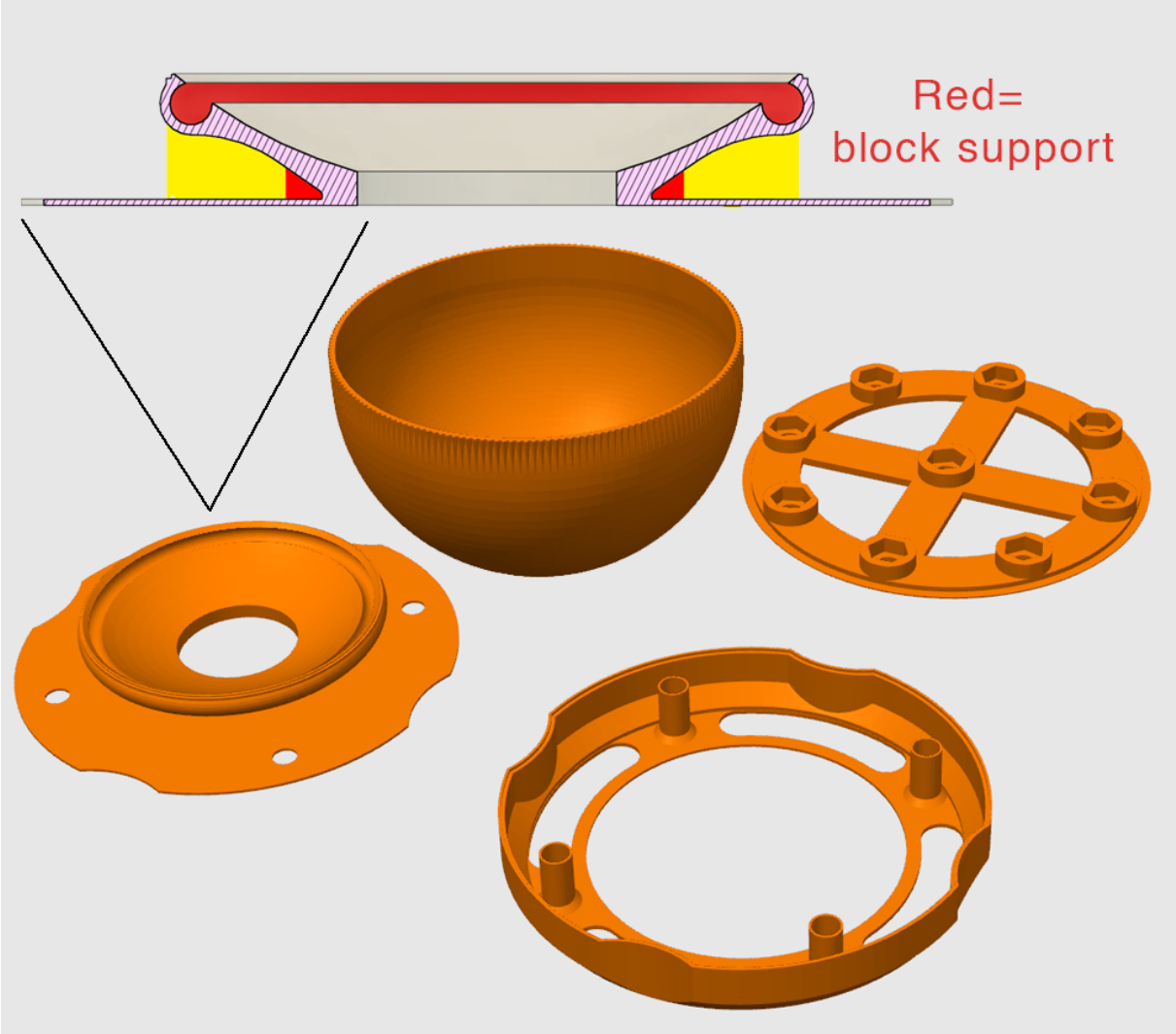
4 m8 rubber feet. OR printed alternative. Will need to be spaced or cut flush with the bolt, see:



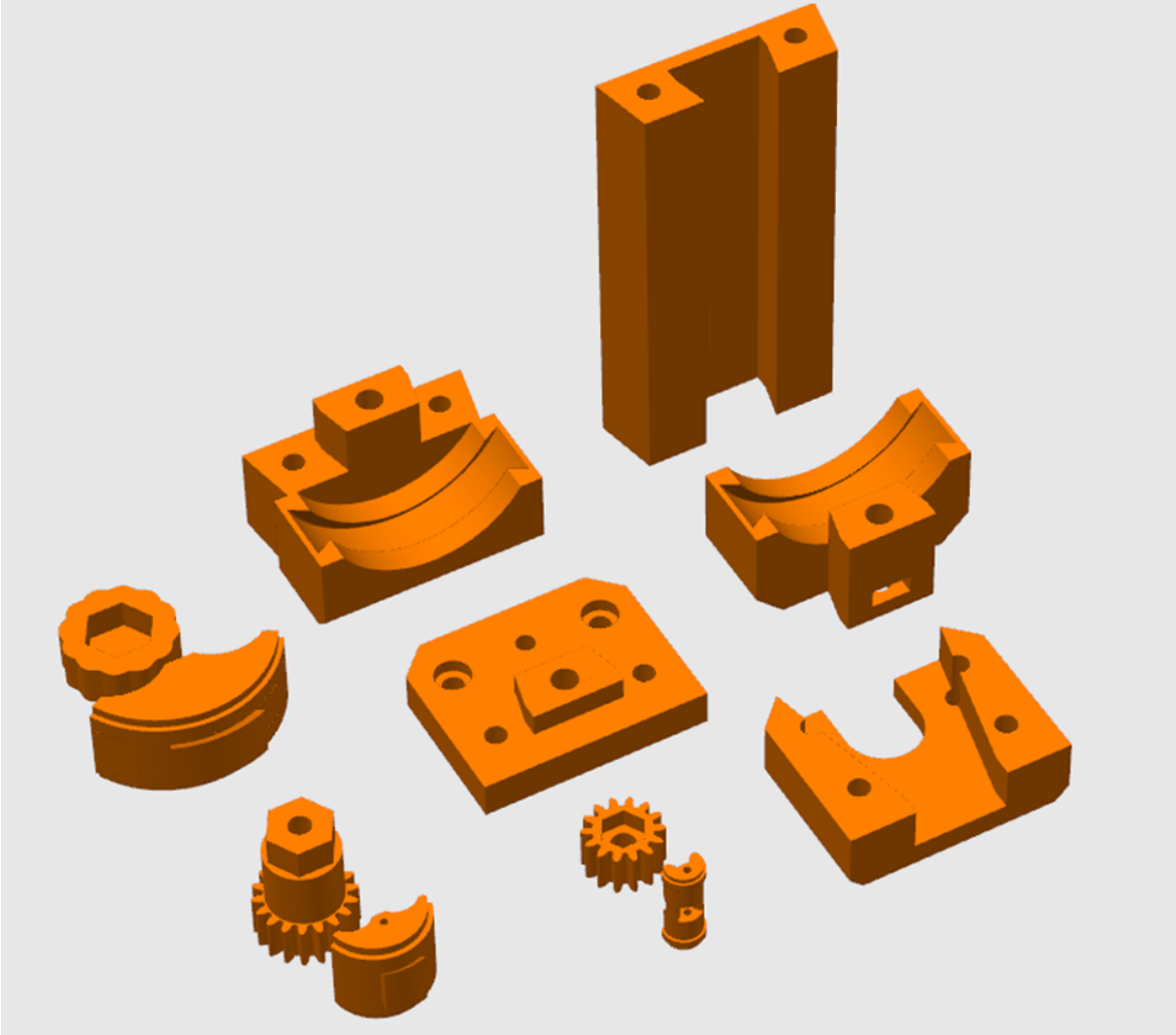
Cut the bolts flush with the nuts.
9 m8 coupler nuts, 13mm across flats.
Note: Ive seen a lot of comments from people struggling to find these. Ive uploaded a printable alternative, or two regular m8 nuts could be used, at the cost of the ball being weaker and making it harder to mount things to the ball face. The printable alternative will need to be threaded with either a m8 or 5/16th tap to cut the threads.
A 5 inch lazy susan turntable.
https://www.aliexpress.com/item/1005006908468800.html?spm=a2g0o.productlist.main.17.1bd77235dUVOHQ&algo_pvid=8d0f7d00-862b-4e14-b1f9-4fb0de9ee15b&algo_exp_id=8d0f7d00-862b-4e14-b1f9-4fb0de9ee15b-8&pdp_npi=4%40dis%21AUD%2120.99%2120.99%21%21%2198.5
url=scene%3Asearch%7Cquery_from%3A
20cmish of 6mm diameter rubber... band? strap? A 6mm cylinder of rubber or other grippy material.
Around 2KG of concrete or plaster. IDEALLY, concrete + as much small steel objects like old screws you can find. This maximizes the weight.
For the workholding:

PCB vise:
3 m4*30mm bolts, hex head
2 m4*40+mm bolts, hex head. Longer bolts let the jaws open wider. 40mm is just long enough for flat stock up to about 4mm.
Painting handle:
1 m8*20mm bolt, can be up to 50mm.
Glue.
Cylinder holder:
1m4*30mm bolt, hex head.
1m4 nut.
Optional threaded insert to replace the nut. Weaker but easier to install.
Vise Designs, see 7:30 on:

Printing advice:
Mostly, the print details are not super important. I print at 3 walls, 25% infill, .2 layer height. I use cheap PLA for everything.
Enable support. Not much specific to change aside for the ball support piece, which needs some support blocking as illustrated here:



Other parts should be printed most ideally in the following orientation:



Model files

Main ball 4 files

bottom-cover-v1.stl

nut-ring-v1.stl

ball-v2.stl

bottom-v1.stl

Untested

3 files

vise-block-v2.stl

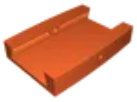
moving-jaw-v1.stl

static-jaw-v1.stl

Workholding

24 files

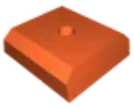
vise-plate-v1.stl



vise-v-v1.stl

gear-cage-a.stl

knob-b.stl



mini-mount-base-v1.stl

pcb-jaw-b-v2.stl

spacer-v2.stl

pcb-jaw-a-v2.stl

gear-b-v1.stl

knob-a-v2.stl

painting-handle-v2.stl

gear-a-v1.stl

pole-grabber-v1.stl

gear-b.stl

vise-knob.stl

swivel-large.stl

vise-body.stl

gear-a.stl

plate.stl

moving-jaw.stl

swivel-small.stl

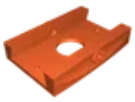
fixed-jaw.stl

end-piece.stl

swivel-mid.stl

balls.step

vise-adaptor-plate-v2.stl



dovetail-v2.stl

lock-cover-m4.stl

index-plate-v1.stl

coupling-nut-loose.stl

coupling-nut-tight.stl

lock-cover-m3.stl

m3-knob.stl

squinn-pcb-adaptor-v1.stl

v15-step.step

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