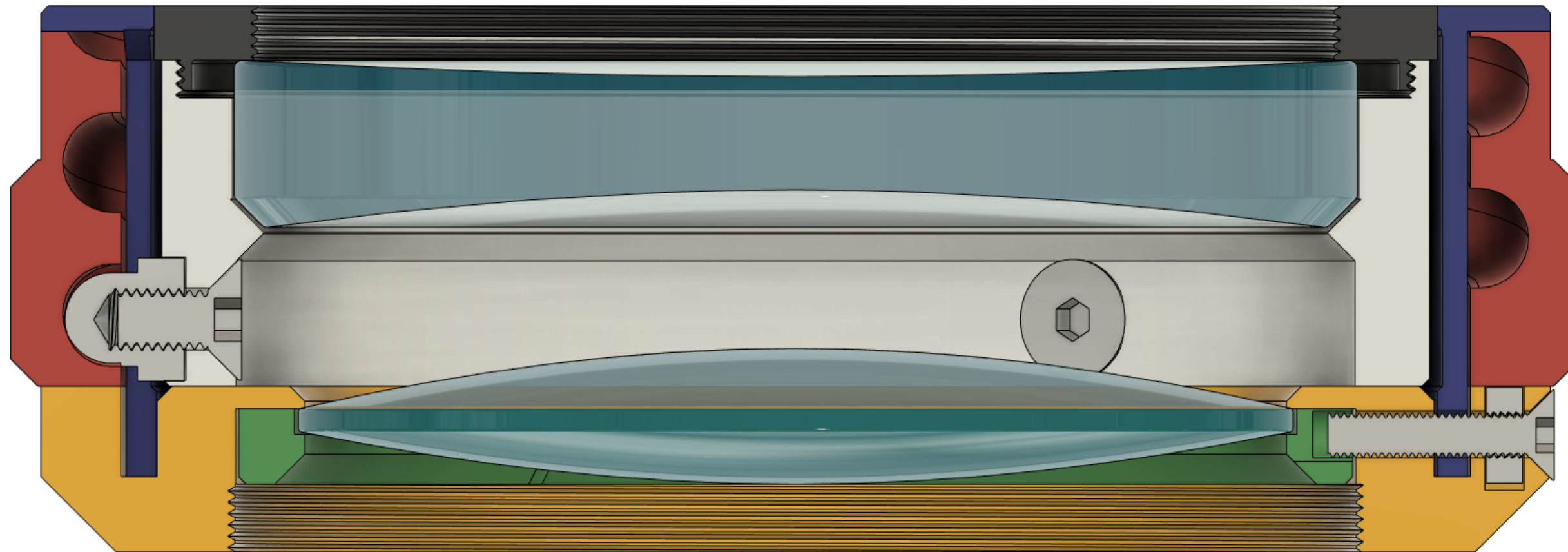


the Pfocus

the 3D printable DIY single focus solution
based on the Fujinon WCV-82SC wideangle converter

construction manual



TECHNICAL SPECIFICATIONS	
focus range	~50cm to infinity (measured from the front of the lens)
focus throw	~180°
focus direction	clockwise and counter-clockwise are available ("Canon" or "Nikon" style)
image widening	0,84x magnification (due to the nature of the used wide-angle adapter glas)
max coverage	37mm (@ 13mm sensor height, over the full focus range, 2x scope, 2,39:1 DCI) *
mounting	universal mount (75mm tubing with lock screws) M75x0,75 female thread 77mm male thread
focus gears	standard mod 0.8, 128 teeth
weight (PLA, 30% inf)	~350g (universal mount) ~335g (75mm and 77mm mount)
dimensions	diameter 104mm length @ infinity 42mm (universal mount) 37mm (75mm and 77mm mount) length @ close focus 57,5mm (universal mount) 52,5mm (75mm and 77mm mount)
filter size	82mm max, your choice

* 77mm mount option and front filter smaller than 77mm cover less

ADDITIONAL PARTS NEEDED

- 1x Fujinon WCV-82SC (also labeled as JVC WCV-82SC)
- 3x M3 nut (e.g. DIN 934)
- 3x M4 domed nut (e.g. DIN 1587), make sure the tip is round and not slightly pointy
- 3x M3 screw, 15 or 16mm, countersunk head (e.g. DIN 965, Torx recommended), fully threaded, length must include head!
- 3x M4 screw, 8mm, countersunk head (e.g. DIN 7991, Torx recommended), fully threaded, length must include head!
- 3x self-adhesive black velours, (at least 3x 22 x 70mm and 1x 7 x 232mm in size) (I use D-C-Fix)
- grease for the focussing mechanism (I use SuperLube multi-purpose synthetic grease, with syncolon PTFE)

depending on your choice for the front threads

- 72mm or smaller: 1x 82mm step-down ring (smaller than 72mm is not recommended though)
- 77mm: 1x 82-77mm step down ring
1x 77mm filter with retainer-ring (e.g. cheap UV or diopter)
- 82mm: 1x 82mm filter with retainer-ring (e.g. cheap UV or diopter)
needs you to also print 82mmRETAINER
- none: original retainer-ring that held the front element in your Fujinon wide-angle adapter

depending on your choice for the mount

- universal mount: 3x M4 thumbscrews, ≈15mm, nylon screws are recommended
3x M4 nut (e.g. DIN 934)
- 77mm male: 1x 77mm Cokin P adapter ring (Cokin P477 or compatible aftermarket one)
- 75mm female: no additional parts needed

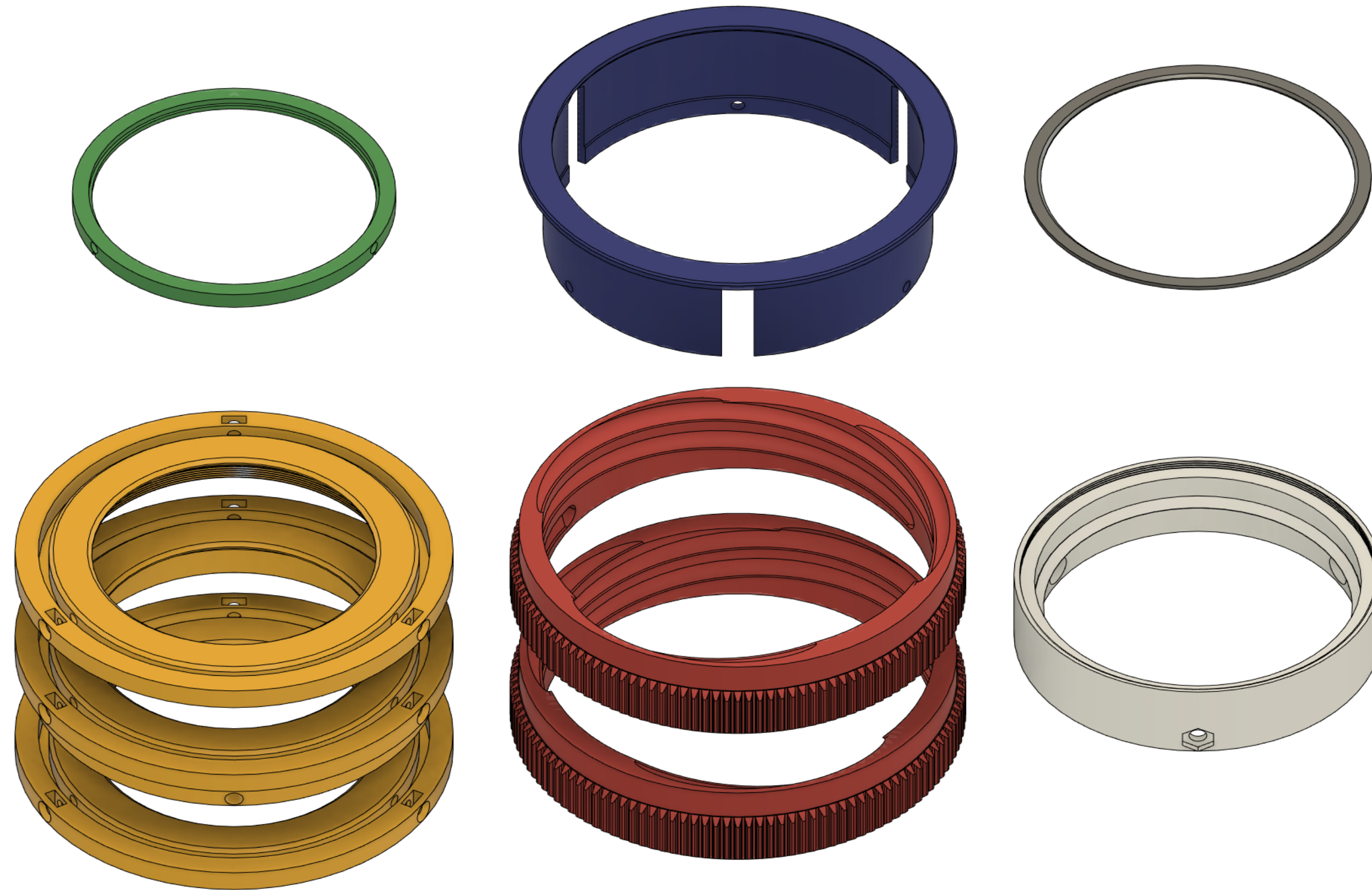
TOOLS NEEDED

- screw driver fitting your screws of choice
- sandpaper (80, 120, 280 and 400 grit)
- lens wrench (only for 77mm front thread option)
- matte black acrylic based permanent marker / black Sharpie
- glue / epoxy (optional)
- lens cleaning material
- rubber gloves for lens insertion
- compressed air is handy for dust and flake removal

PRINTING ADVICE

- printing in **black** is **highly** recommended
 - if you decide to print in different colour(s), make sure to blacken out and / or flock the complete light-path
 - HELICOID is the only part that can be printed in a different colour without meaningful impact
- 30% infill works for all parts
- layer height can easily can be as rough as 0,2mm for most parts, as a lot of sanding is needed anyway
 - HELICOID: use layers as small as you possibly can
 - FRONTLENS: 0,15mm is recommended because of the 0,75 pitch threads
 - FOCUSTUBE: 0,2mm works well
 - REARRING: 0,2mm is recommended for proper wall thickness
 - BOTTOM: 0,2mm is fine
 - 82mmRETAINER: 0,2mm works well

Step 0



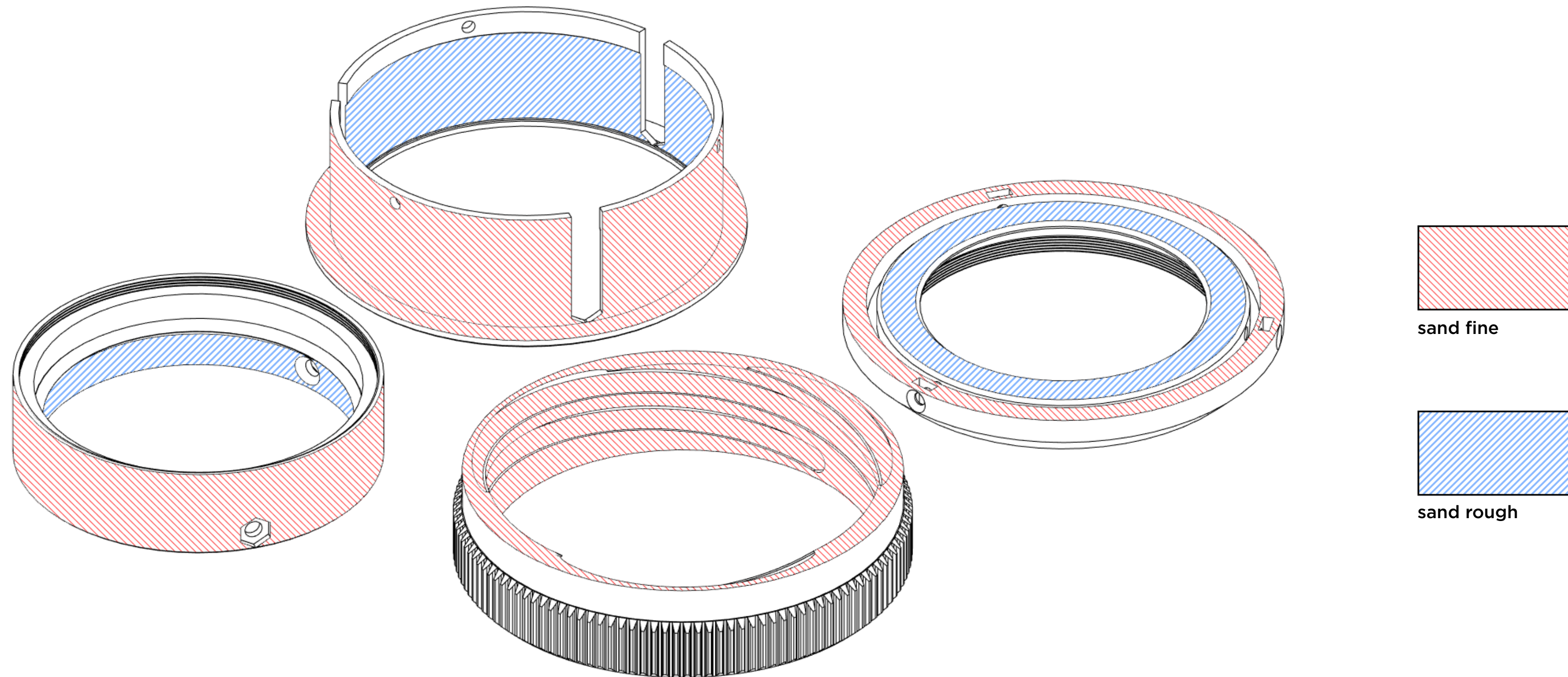
Print all parts needed for your desired setup.

Make sure to choose the right variants for your build (like focus direction of the helicoid and mounting option).

Every part prints well **without support**, make sure to orient it properly in your slicer (e.g. BOTTOM needs to be upside-down). It is essential to print HELICOID **without support**.

This is a build that needs a certain precision, so make sure your printer can create proper dimensional accuracy.

Step 1



Some parts need a good sanding up front to prepare them for a smooth focussing experience. Don't sand too fast and avoid electrical tools, else the material might melt. I use grits of 80, 120, 280 and 400.

- the HELICOID will need the most attention, layers inside the coils should be completely smoothed out. The top and bottom also need a bit smoothing, as well as the small areas between the coil. These areas should be smooth.

Tip an M4 domed nut can help guiding the sandpaper through the helicoid properly and evenly.

- the FOCUSTUBE needs to be smooth outside as well as at the rim, basically everywhere the helicoid will contact it later on.

A quick roughen should be applied to the recessed area on the inside, this is preparation for attaching the self-adhesive velours later.

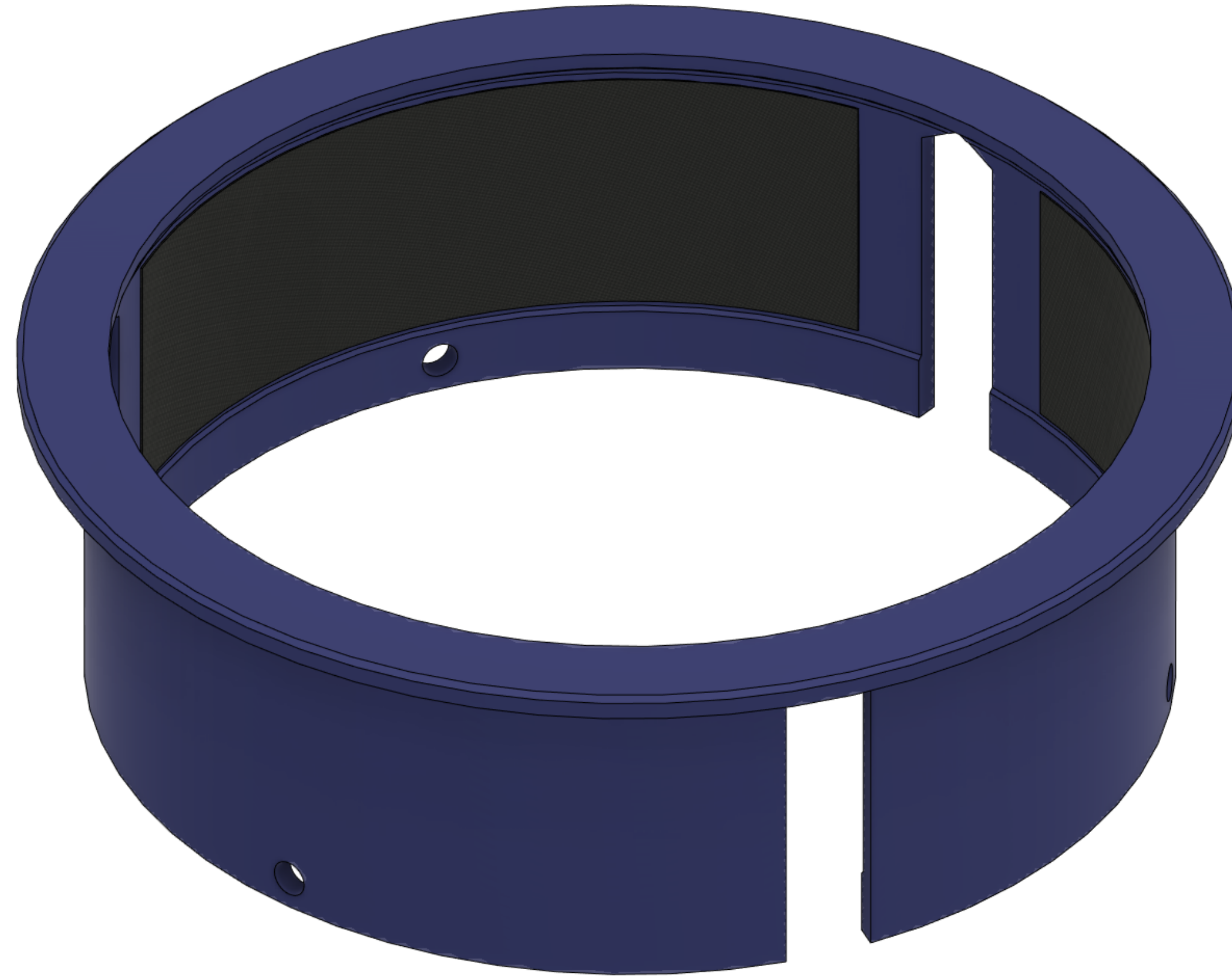
Tip place FRONTELEMENT inside of FOCUSTUBE to have a better grip and prevent accidentally breaking it.

- the FRONTELEMENT should also be smooth on the outside and at least a bit on the upper inner part. A quick roughen on the lower part of the inside (where the screws will sit) is also recommended.

- on BOTTOM, you need to make the most outer rim (with the three slits) smooth. It's also recommended to roughen the inner rim to avoid internal reflections.

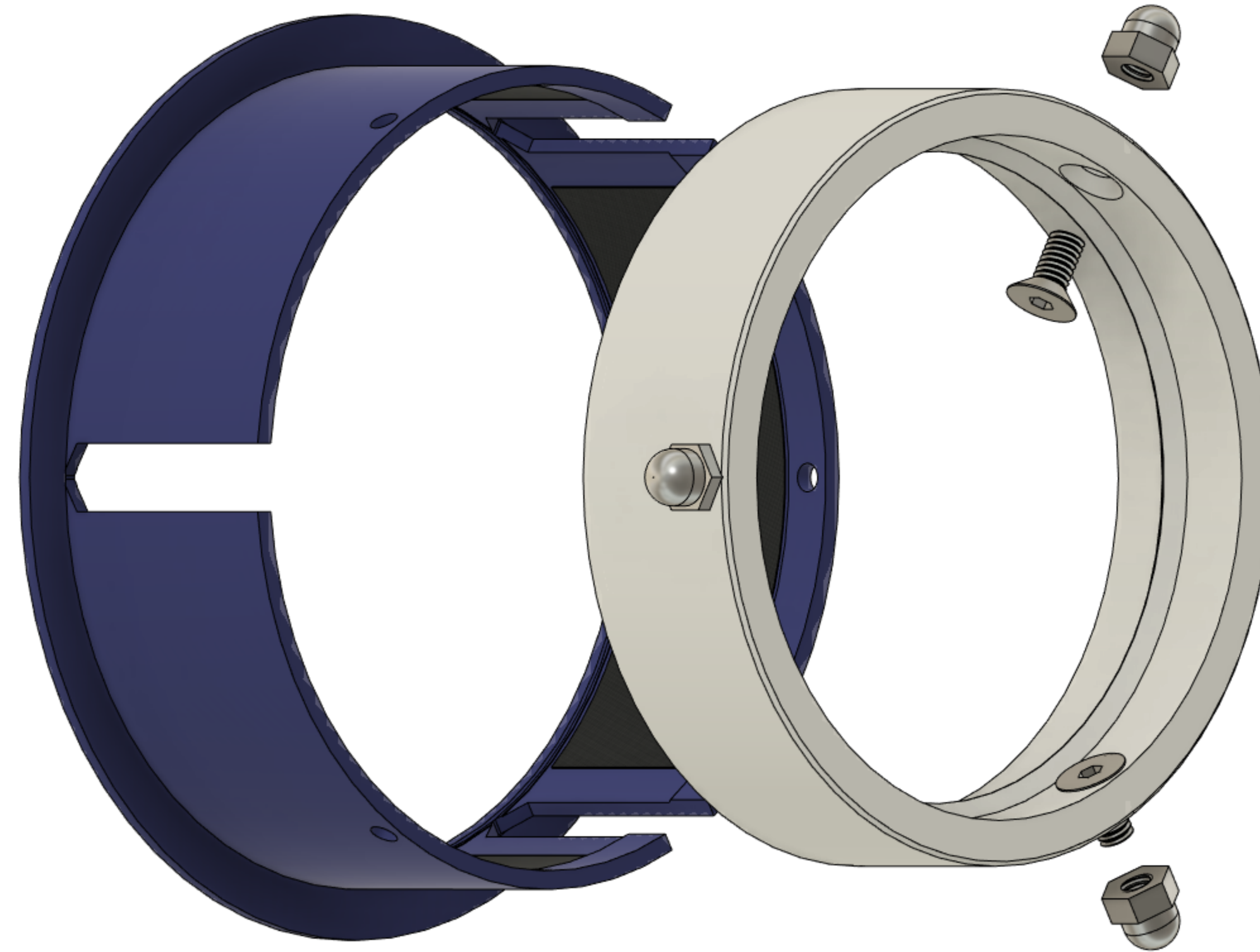
It's also generally recommended that you make sure all parts fit properly upfront before proceeding to put a lot of time into preparing the parts.

Step 2



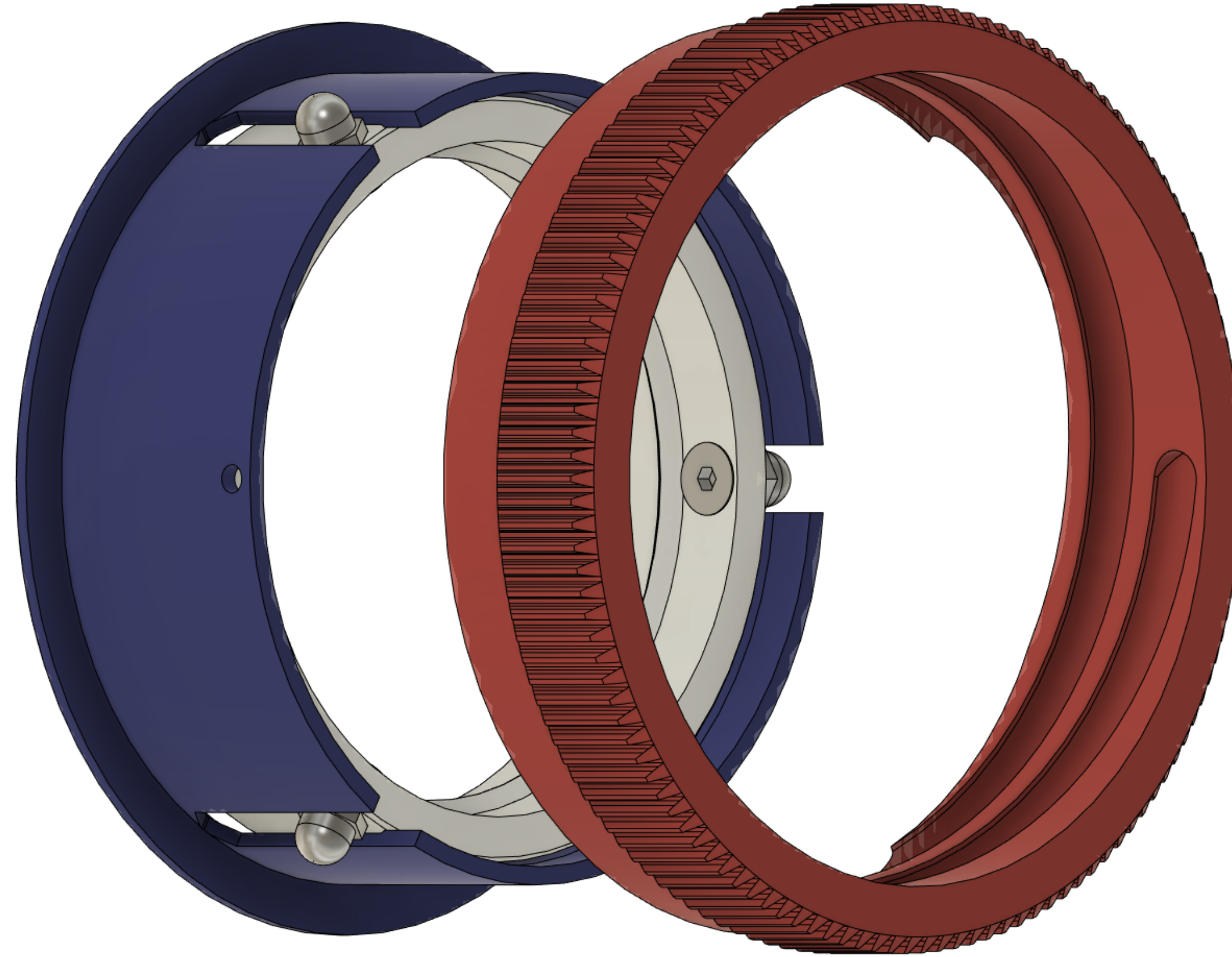
Apply three strips of self-adhesive velours (around 22 x 70mm) between the longholes into the recessed area of the focus tube. Be careful not to apply them on non-recessed areas; there's meant to be some distance from the longholes.

Step 3



Insert the M4 domed nuts into the hexagonal stencils of FRONTELEMENT, guide the 8mm M4 screws through the holes on the other side and screw them tight (don't overtighten!). Now push FRONTELEMENT with the threads first into the rear of FOCUSTUBE, the domed nuts guiding through the longholes.

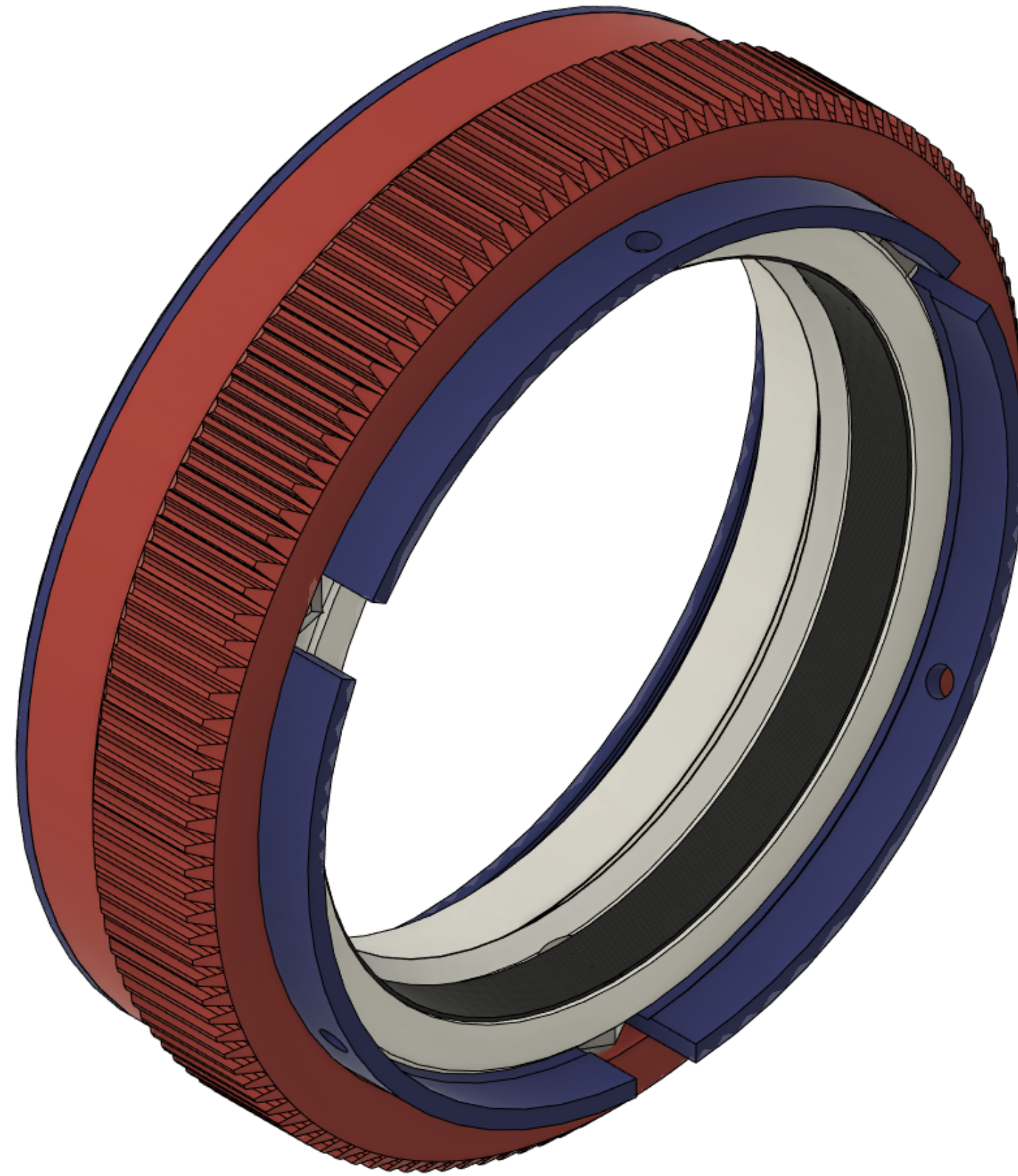
Step 4



Screw the HELICOID over the the FOCUSTUBE. Make sure that the focus already runs smooth, if it's still rough (or uneven), inspect the parts and make sure everything is smooth as it should; re-sand if necessary. If you can't nail down where it runs unsmooth, also check HELICOID and FOCUSTUBE alone without FRONTELEMENT to make sure these two run well on their own.

If it eventually runs rather smooth now, you can remove the helicoid and apply grease to the inside of it. Screw it back onto the FOCUSTUBE.

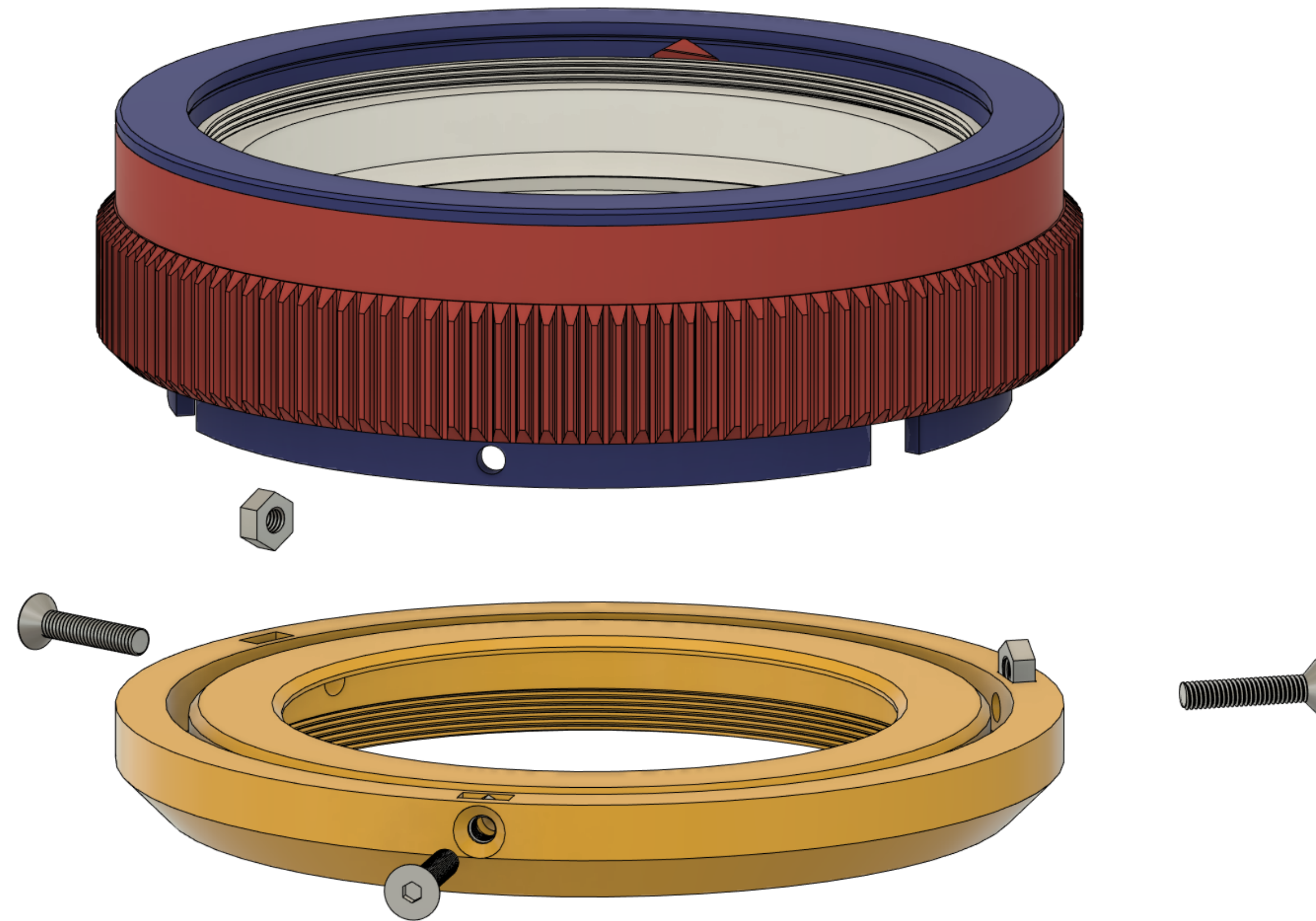
Step 5



Apply self-adhesive velours (around 7 x 232mm) over the thin area where the screws sit; this will reduce light-scatter inside later on.

Make sure that all parts inside the light-path are matte and not shiny, even if your used material is already black. You can either use additional flocking material, or matte black paint like some acrylic based permanent markers.

Step 6

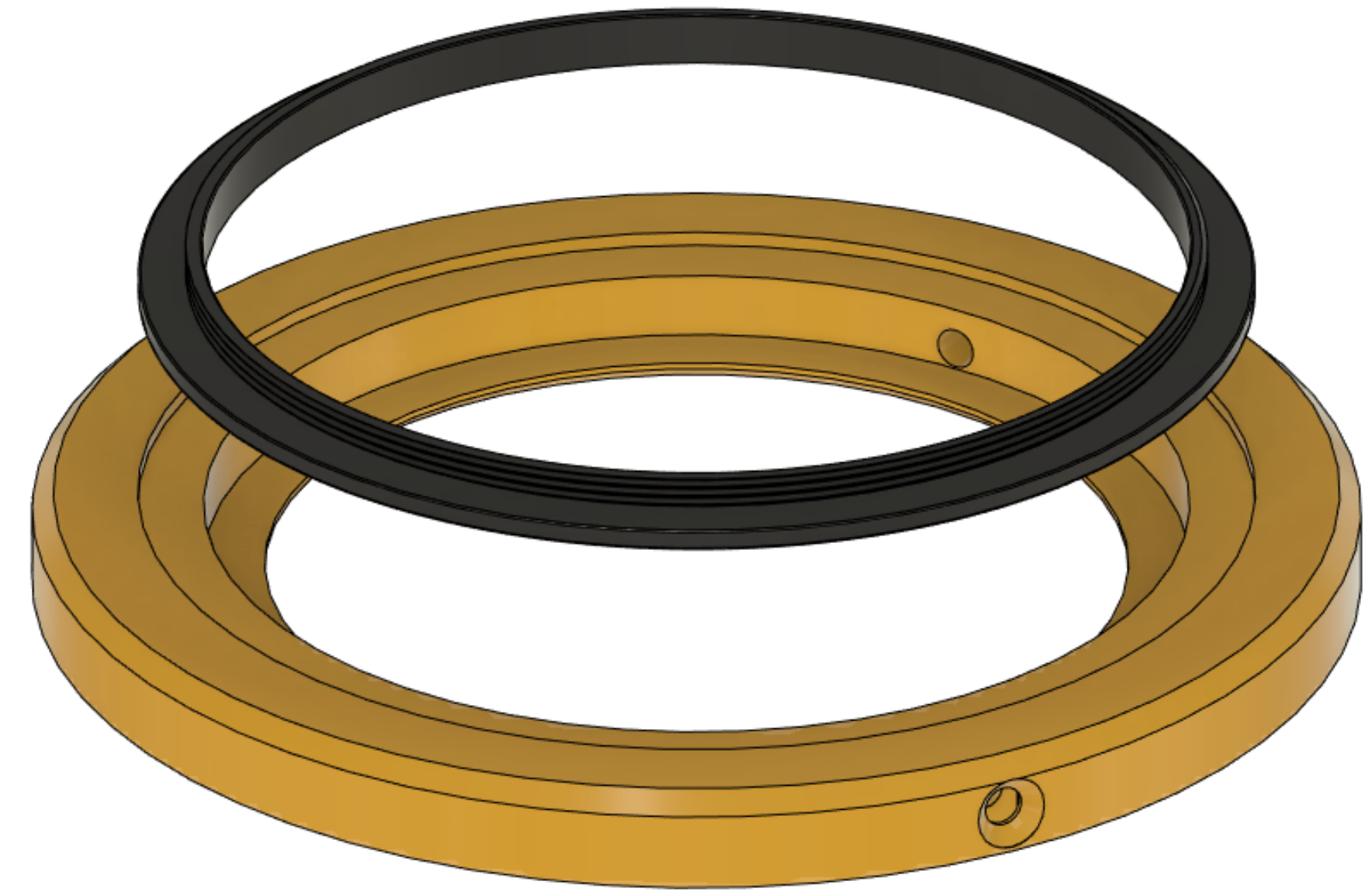
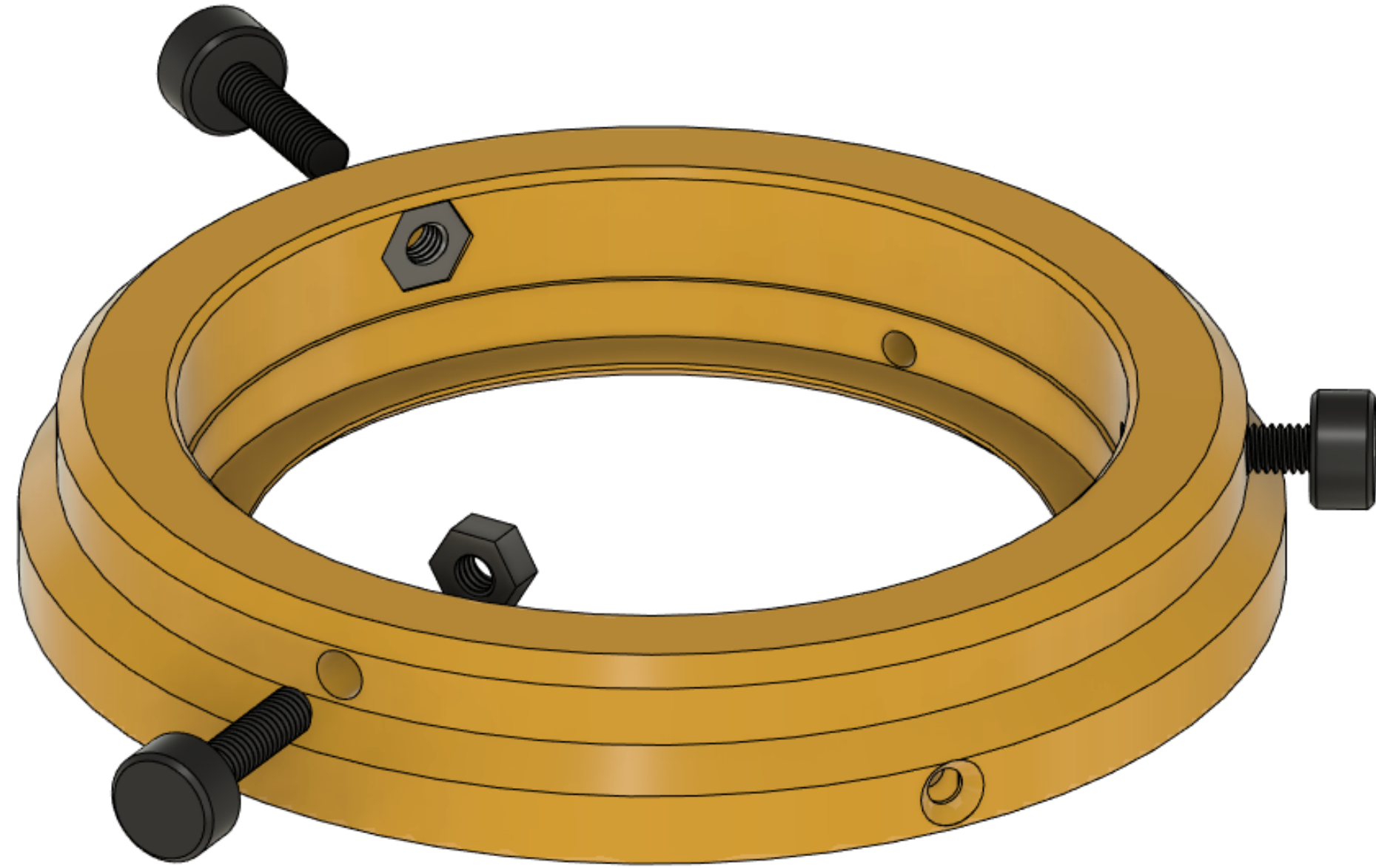


Insert three M3 nuts into the little slits of **BOTTOM**; the pointy side should face up.
It's not necessary, but you can glue the nuts into it as well.

Align the little holes of the **FOCUSTUBE** with the ones on **BOTTOM**. Push them into each other and use the three M3 screws to lock all parts together.

Step 7

(not for 75mm mount)



UNIVERSAL MOUNT

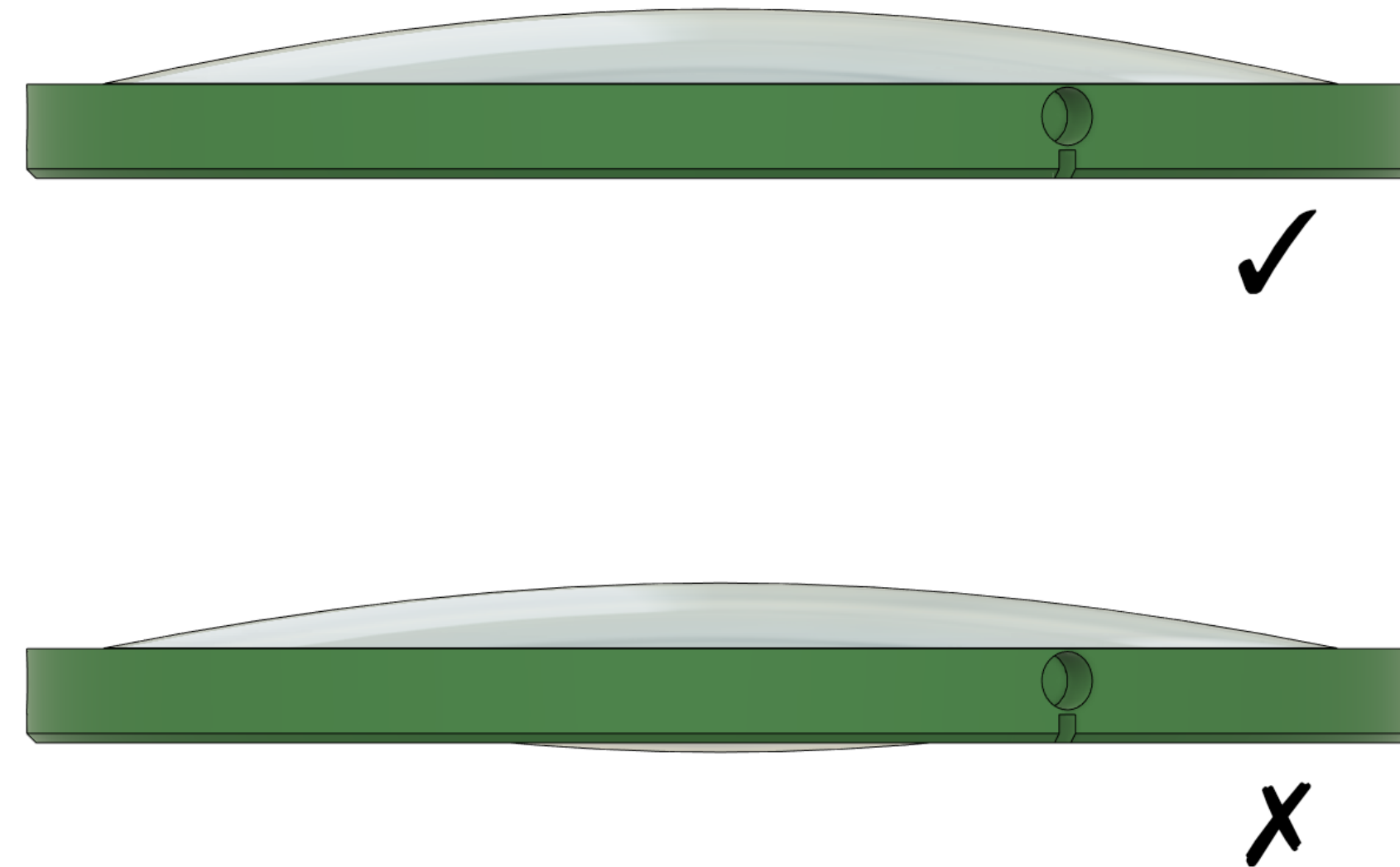
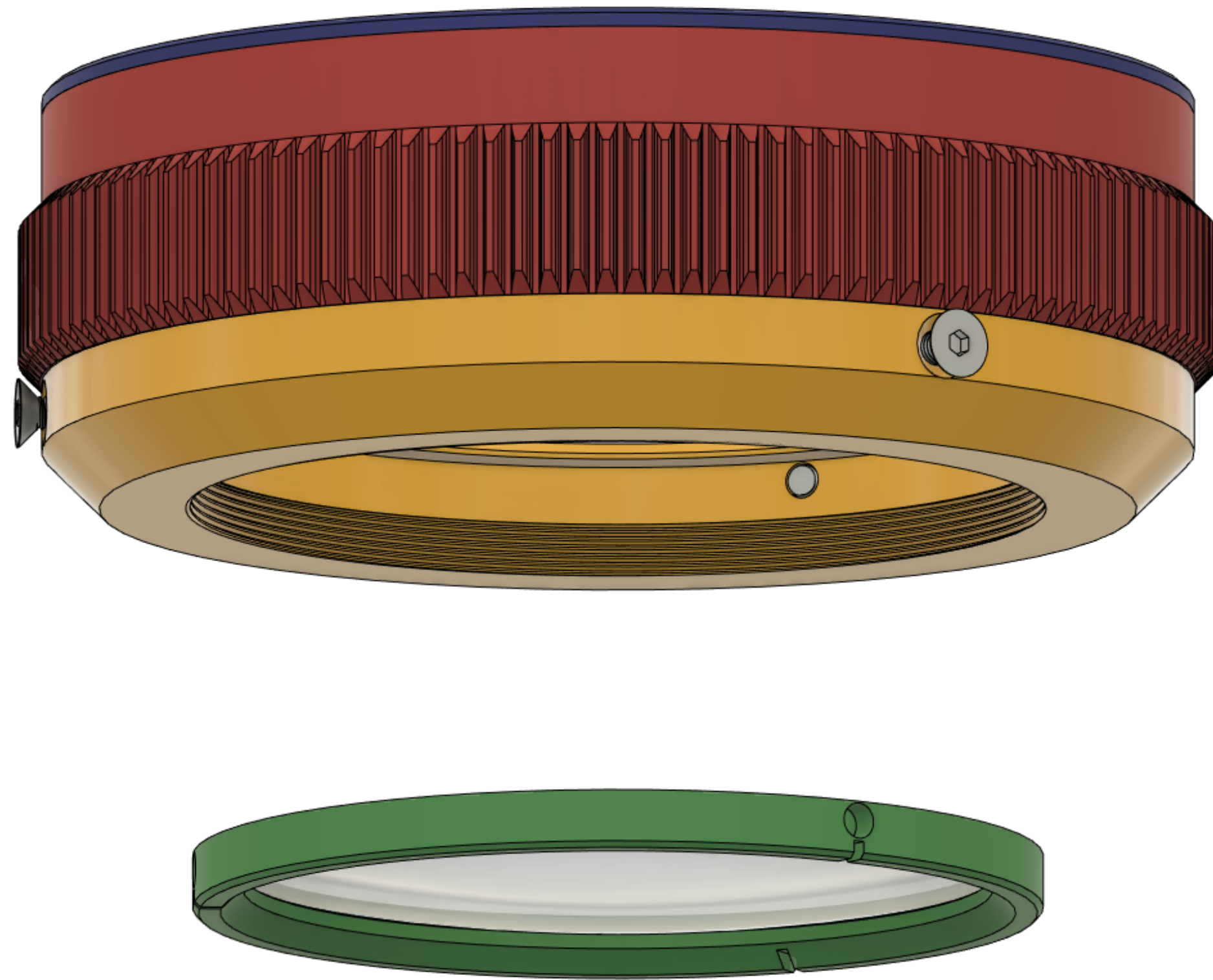
Install three M4 nuts into the hexagonal shapes inside of BOTTOM. The nuts should hold well, using some glue to fix them is still advised though. You can install the three M4 thumbscrews now.

77MM MOUNT

Sand the slightly recessed area of BOTTOM and the front of the Cokin P filter adapter; just roughen it up, don't make it smooth. Apply epoxy (or a different very strong glue) to the recessed area of BOTTOM and place the Cokin P filter adapter on top, press it down properly and let the glue fully dry through.

We are now installing the glas, so make sure to clean the lenses before installing, wear gloves and make sure nothing lose (like flares, dust, etc) is still inside the body.

Step 8



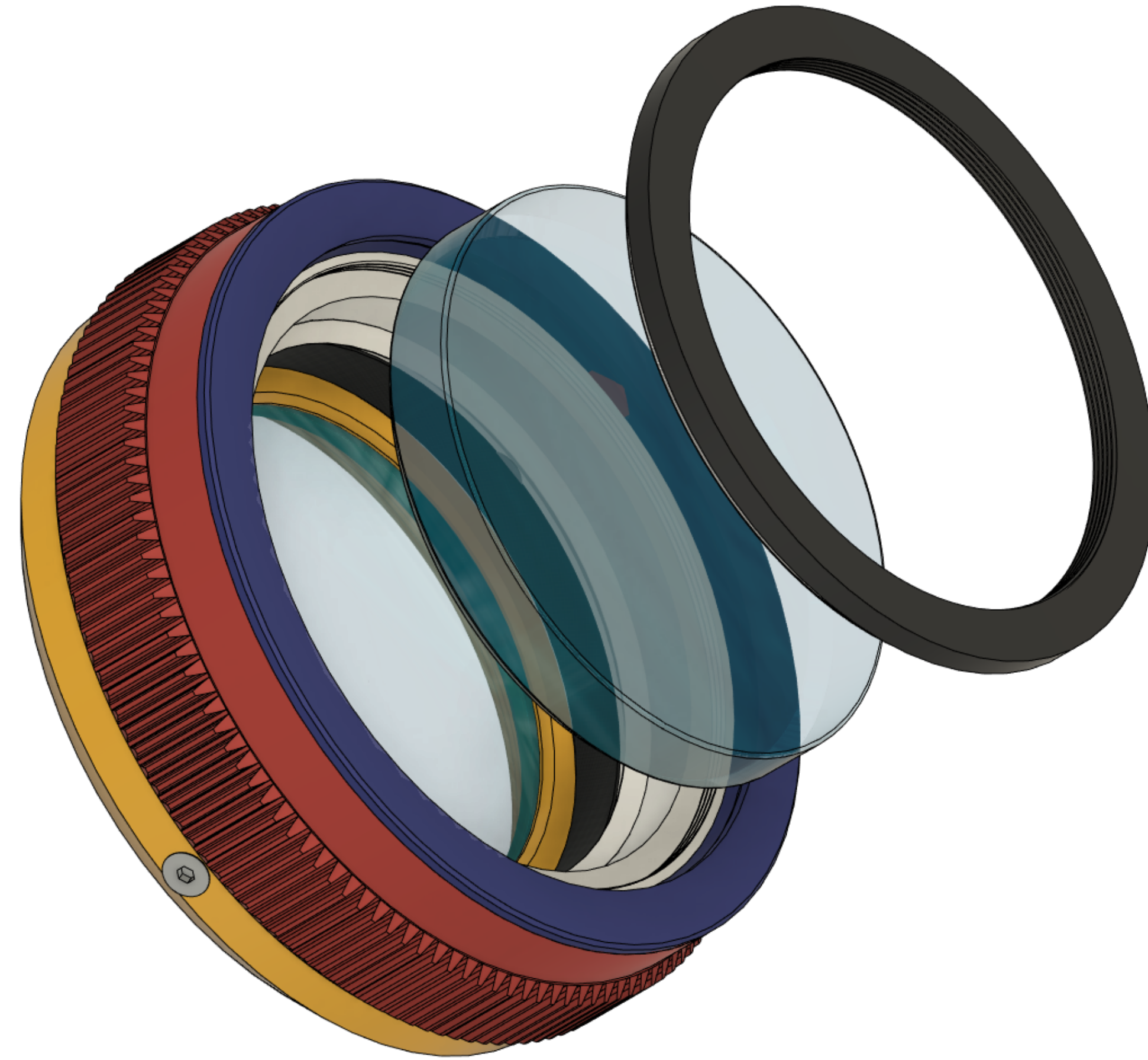
Retract the M3 screws a bit, no part of the screw should be visible inside the tube of BOTTOM. Carefully place the rear lens element into REARRING. Make sure the orientation of the rear element is correct and the same as before in the assembled wide-angle adapter.

Hold REARRING with the glas on it with the fingertips of one hand, then gently push it into BOTTOM of the assembled focuser till you reach the end of the tunnel.

The holes inside of REARRING need to be aligned with the M3 screws; the little indicators on REARRING will help you aligning as well as moving the part into position. When it sits properly, press on the indication and screw the M3 screw tight, one at a time. Make sure REARRING is pressed down properly before screwing, else the rear glas element might not lock properly!

Tip when you don't know the proper orientation of the rear element, place it inside REARRING and look at it from the side. The proper side will not stick out on the bottom, while the wrong side will stick out a tiny bit.

Step 9



Gently insert the front glass element into FRONTELEMENT, it should sit firmly inside.

- 72mm thread (or smaller): screw an 82mm step-down ring into FRONTELEMENT. The lens will already be locked down.
- 77mm thread: screw an 82mm to 77mm step-down ring into FRONTELEMENT. As this won't lock the front lens, we need the retainer-ring of a 77mm filter to screw in here. Use a lens-wrench and be extremely careful when locking it down.
- 82mm thread: unscrew the retainer-ring from an 82mm filter (e.g. a cheap UV or diopter) and remove the glass. Insert 82mmRETAINER into the filter and lock it with the retainer-ring. Now screw this filter into FRONTELEMENT to lock the front element down.
- original retainer: if you don't need or want front threads, you can use the original retainer-ring of the wide-angle adapter and screw it into FRONTELEMENT.

It's not advised to glue this element to keep full maintenance of the focuser. Also you can always change the front-thread solution down the road if you get different filters, encounter more vignette or you just feel like it.

Congratulations! You have assembled your very own unit of *the Pfocus*.