

WARNING: Wear safety goggles at all times when the engine is running and cooling

Please be safe and enjoy your engine. It is not a child's toy it is a precision machined working model.

- Never leave Children unattended with the engine
- Never leave the engine unattended while it is running
- Allow the engine to completely cool down before leaving it or storing it away
- Flammable liquid is required. Read the cautions of the flammable liquid
- Only use methylated spirits (also known as denatured alcohol or ethanol) as a source of fuel
- Only use the supplied burner as a heat source
- Never adjust the engine in any way while it is running or cooling
- The entire engine will get very hot when in use
- Never run on an easily ignitable surface. Always run on a surface that can withstand heat
- Product contains glass. Glass can crack, break or shatter.
- Never run an engine that has damaged glass. E.g. scratches, chips
- Never run an engine if the glass has visible defects. Contact customer services if defects found
- Although the glass is robust it can be damaged through miss-use
- Keep the fuel away from combustible materials
- Never overfill the burner. There is a step in the inside. This is the maximum.
- Always keep the wick trimmed to the length recommended
- While running keep hair and clothing away from the engine
- Never position the engine where the engine can topple or fall
- Keep your face and hands at a sensible distance while the engine is running

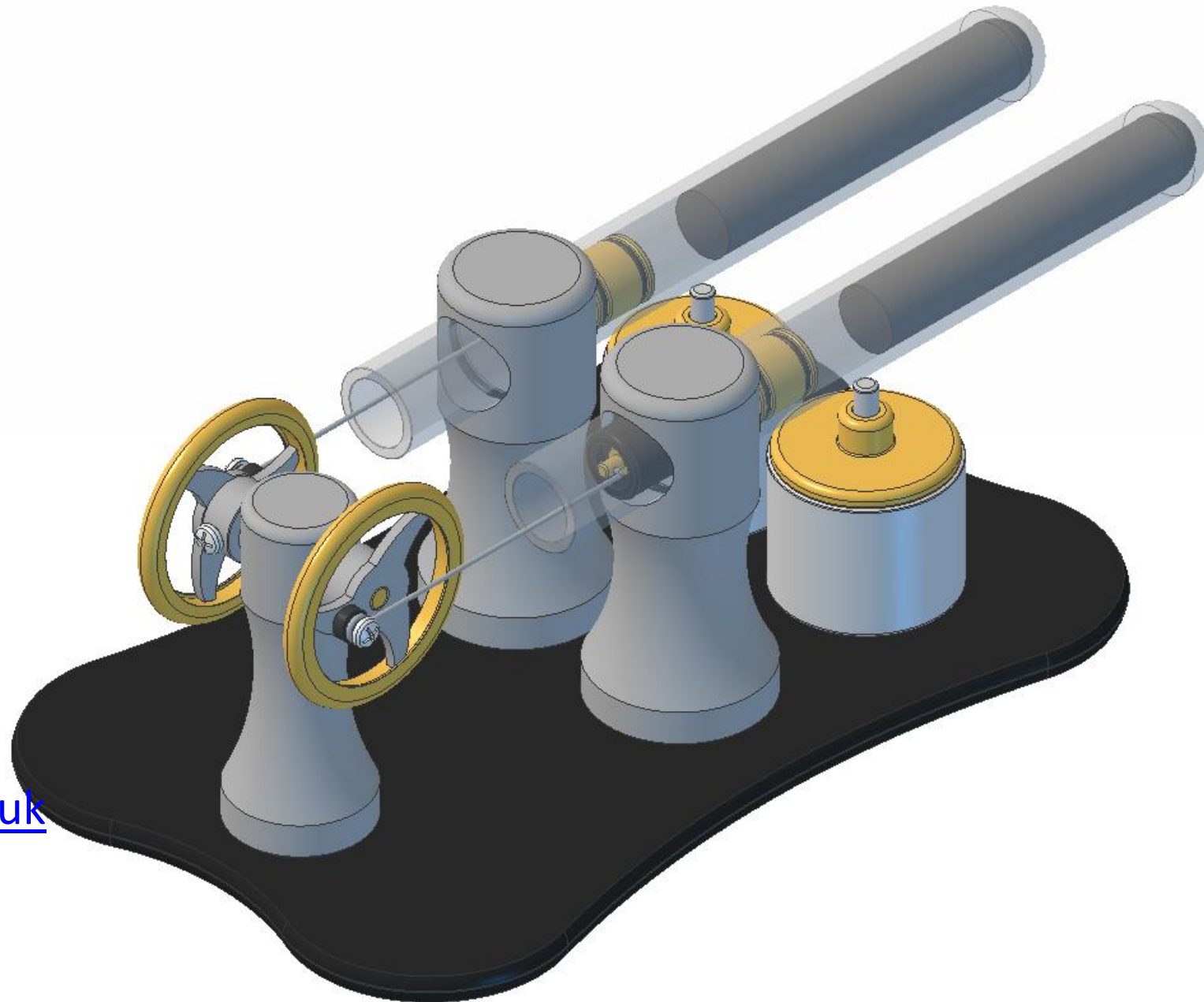
Kontax Stirling Engines KT09T instructions

This document covers the following:

- Tools required
- Parts list
- Assembly instructions
- Operating instructions
- Maintenance

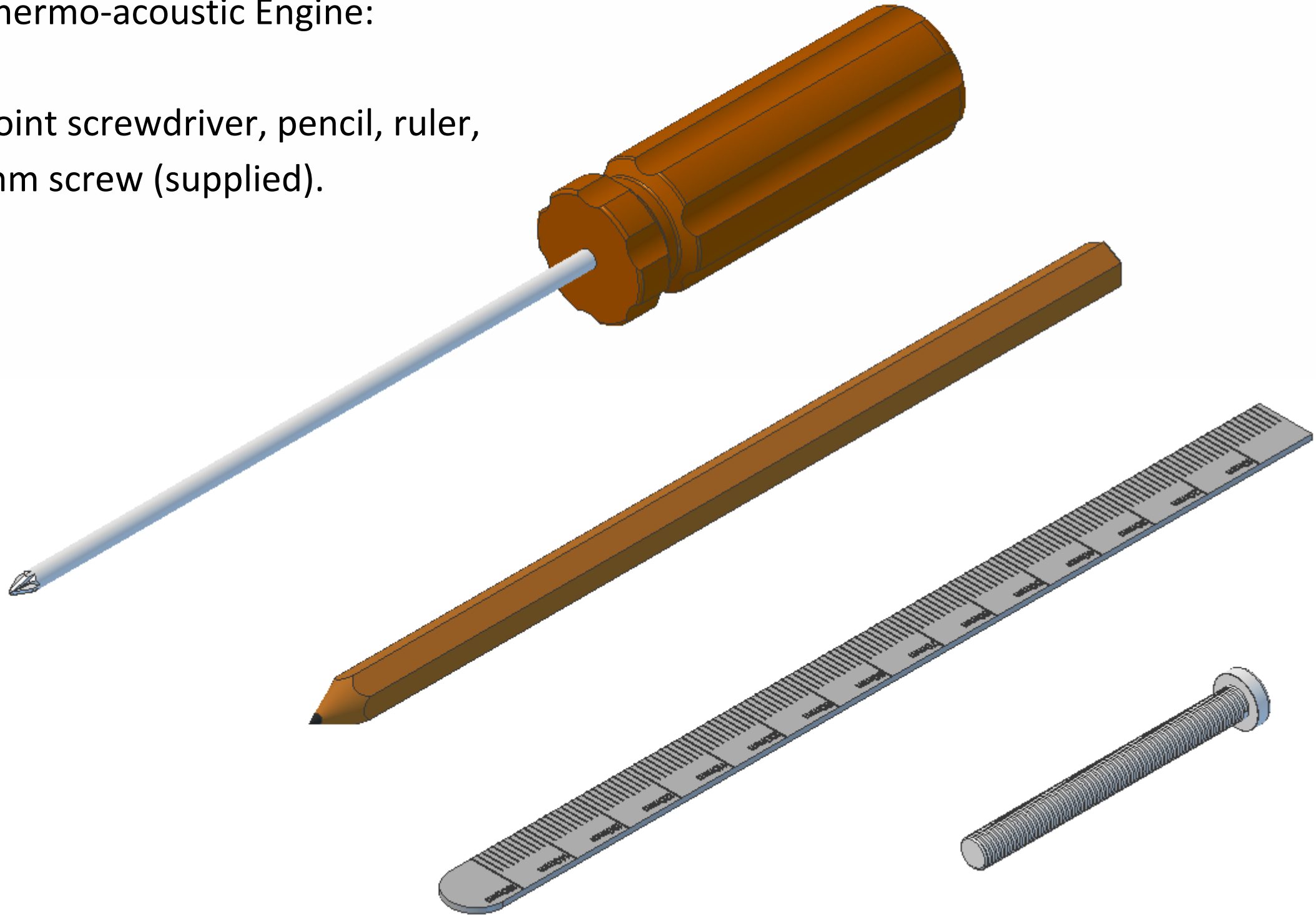
Contact details:

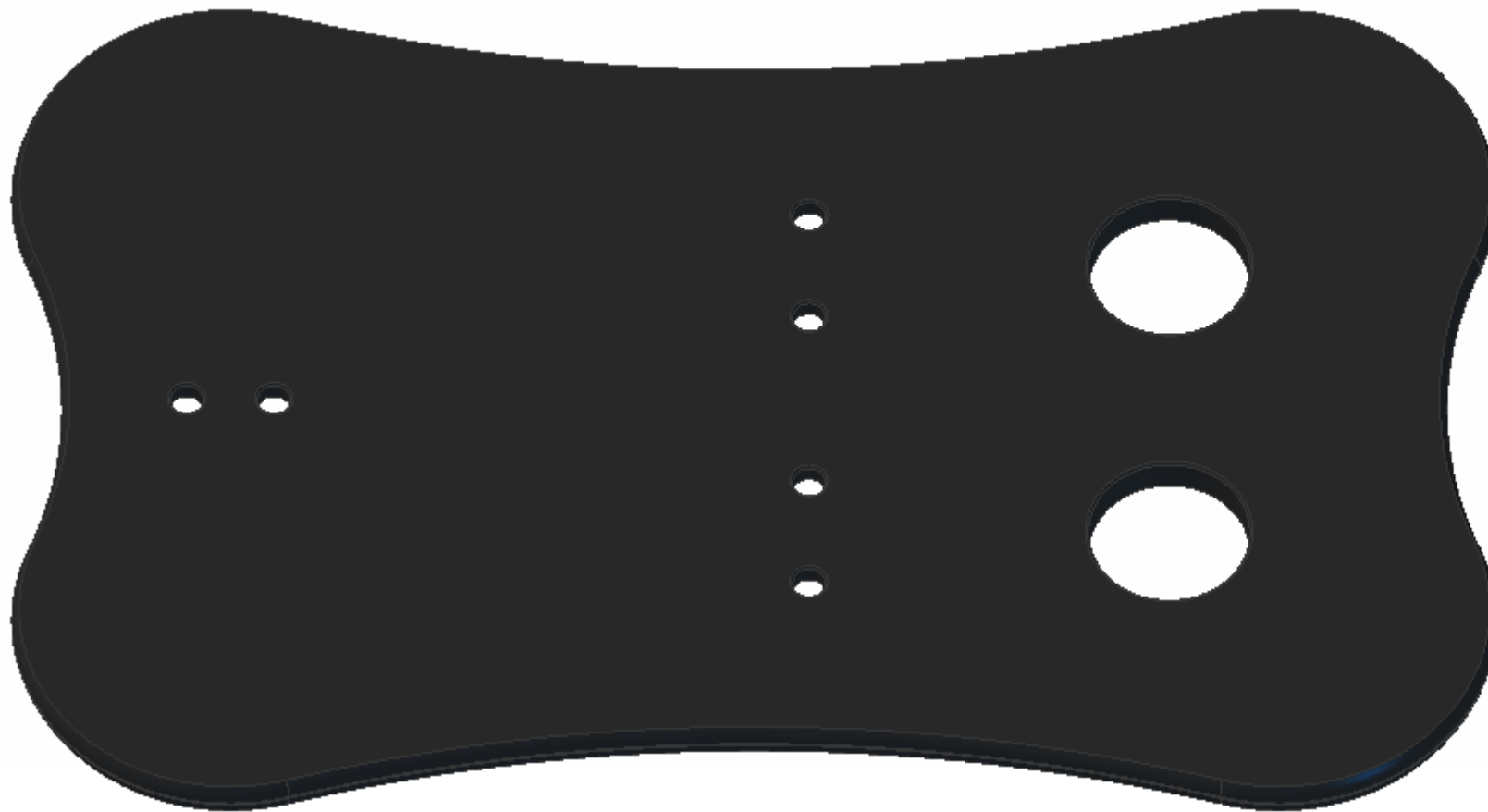
- www.stirlingengine.co.uk
- kontax@stirlingengine.co.uk
- Tel: 01452 905001 (UK)



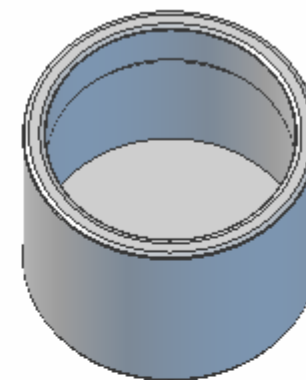
Tools you will need to assemble your
KT09T Thermo-acoustic Engine:

Cross-point screwdriver, pencil, ruler,
M5x50mm screw (supplied).

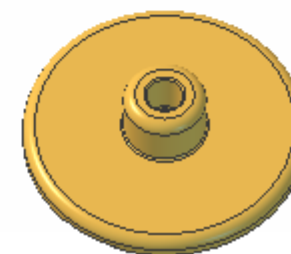




Base plate x1



Burner body x2



Burner cap x2



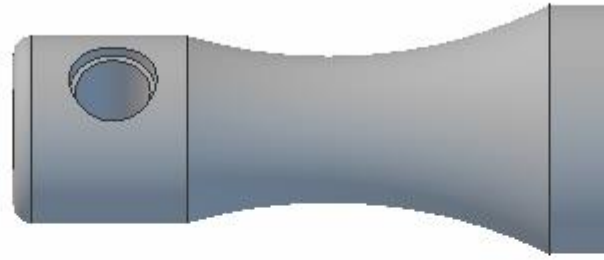
Tube x2



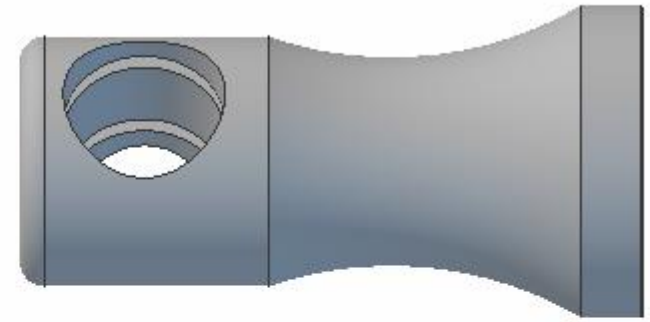
Wick x2



Conrod x2



Wheel pillar x1



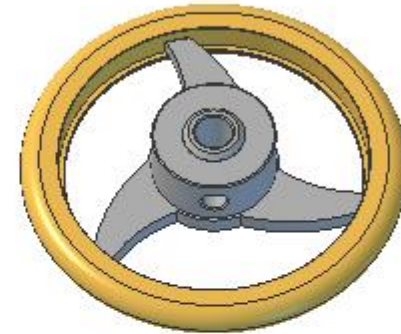
Tube pillar x2



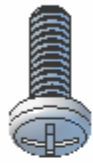
Piston x2



Choke x2



Flywheel x2



M2x6mm
roundhead x2



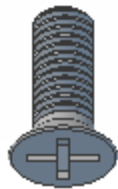
M2x4mm
roundhead x2



12.5mm O ring x4



13mm O ring x2



M3x8mm
countersunk x6



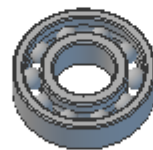
Conrod bush x2



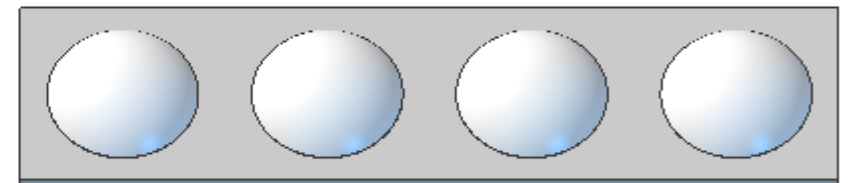
7mm O ring x4



Axle x1



Ball-race bearing x2

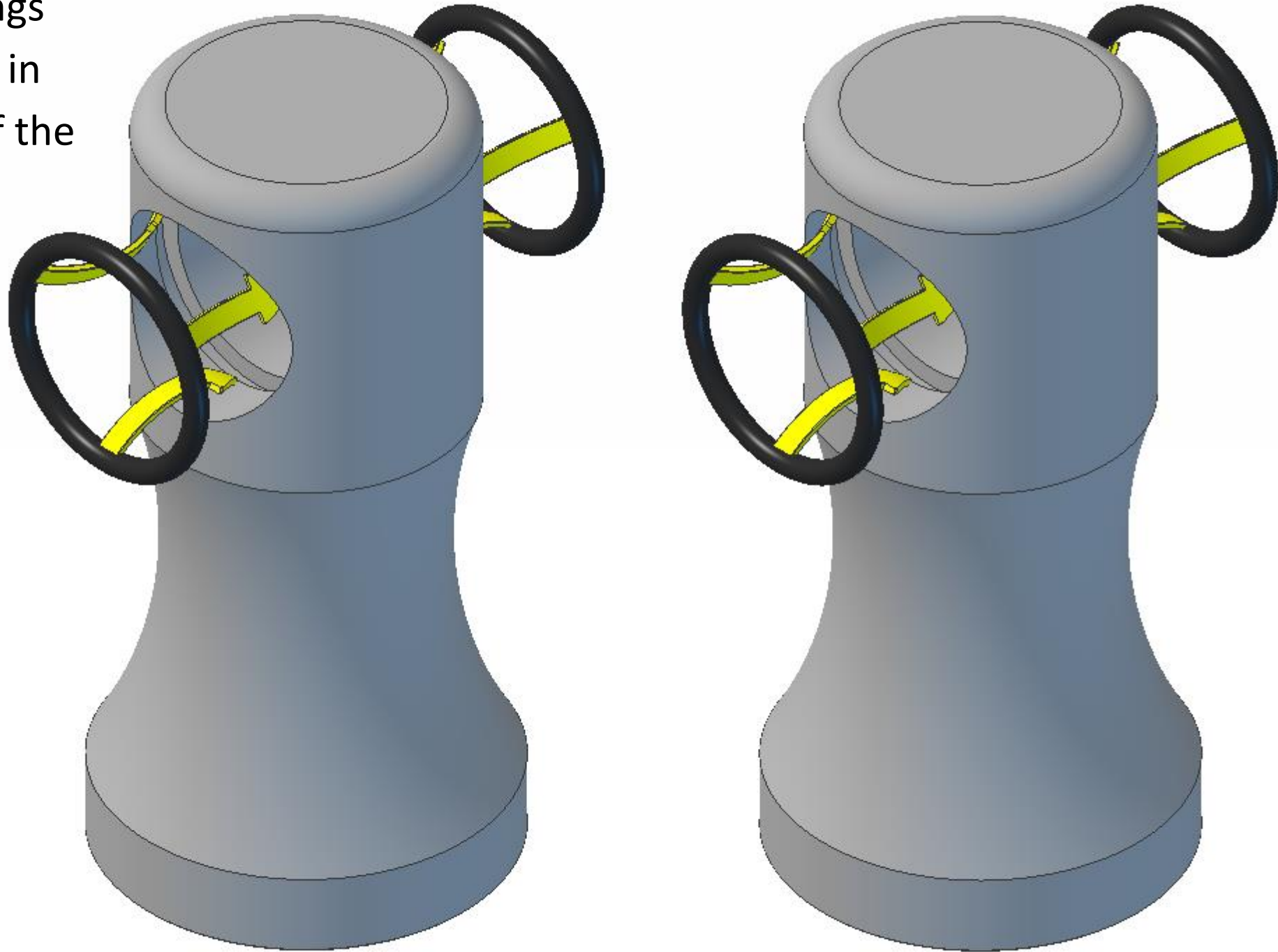


Feet x4 (1 strip)

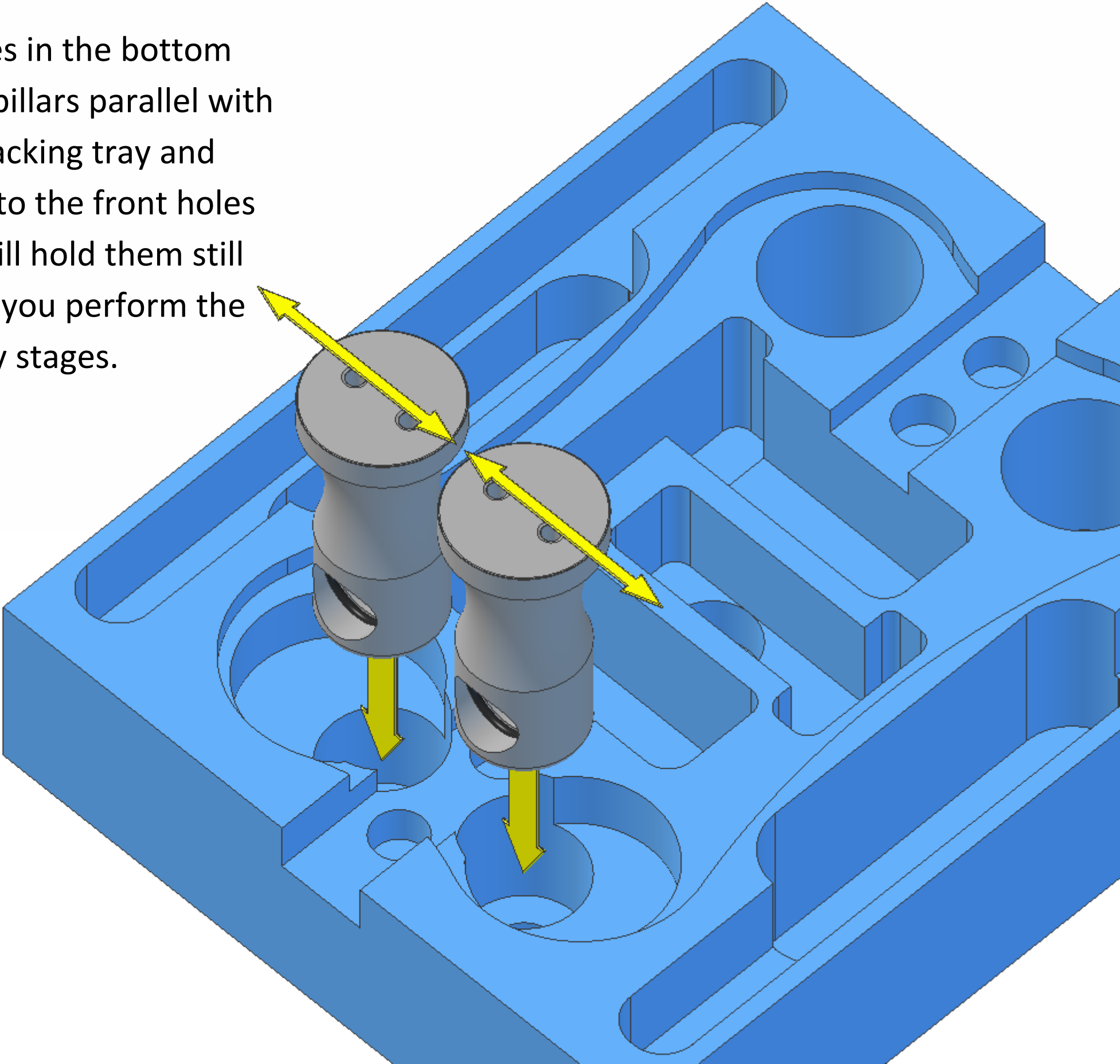
Note, the 12.5mm and 13mm O rings are similar in size. The 12.5mm O rings are thicker than the 13mm ones, you will need the 12.5mm ones for this assembly stage.

Fit two 12.5mm O rings into the two grooves in the hole in the top of the tube pillar.

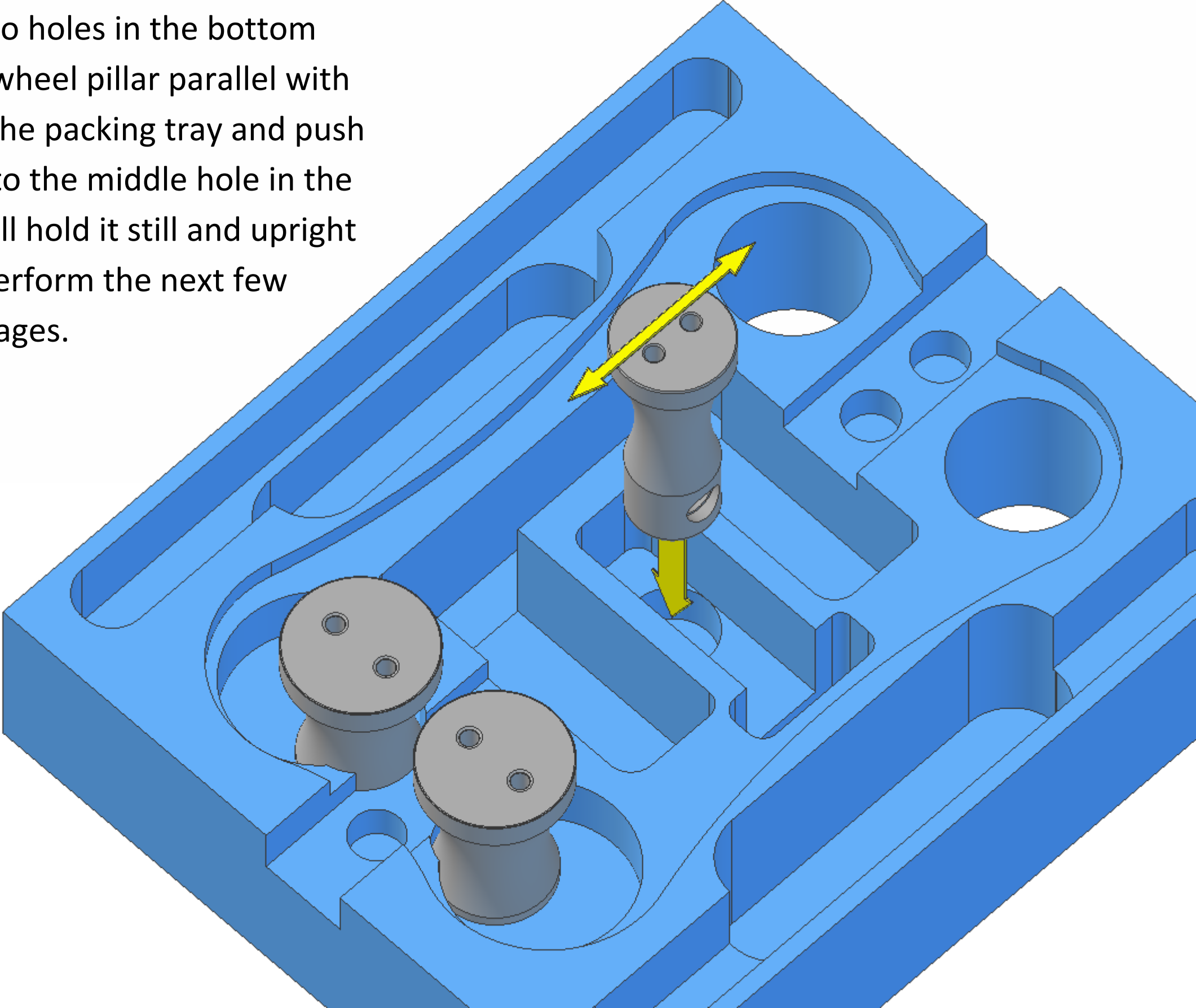
Repeat for the second tube pillar.



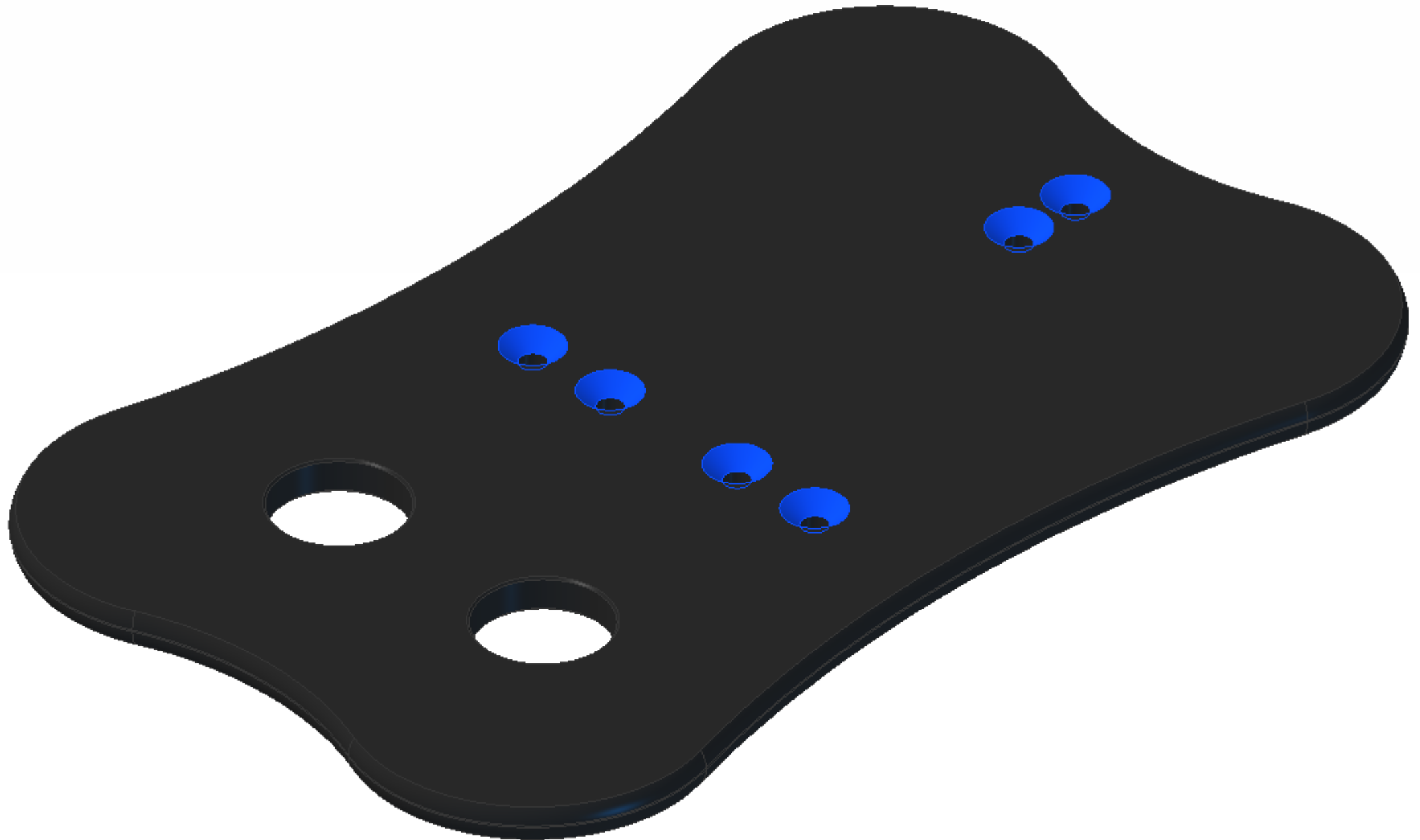
Align the two holes in the bottom faces of the tube pillars parallel with the front of the packing tray and push the pillars into the front holes in the tray. This will hold them still and upright while you perform the next few assembly stages.



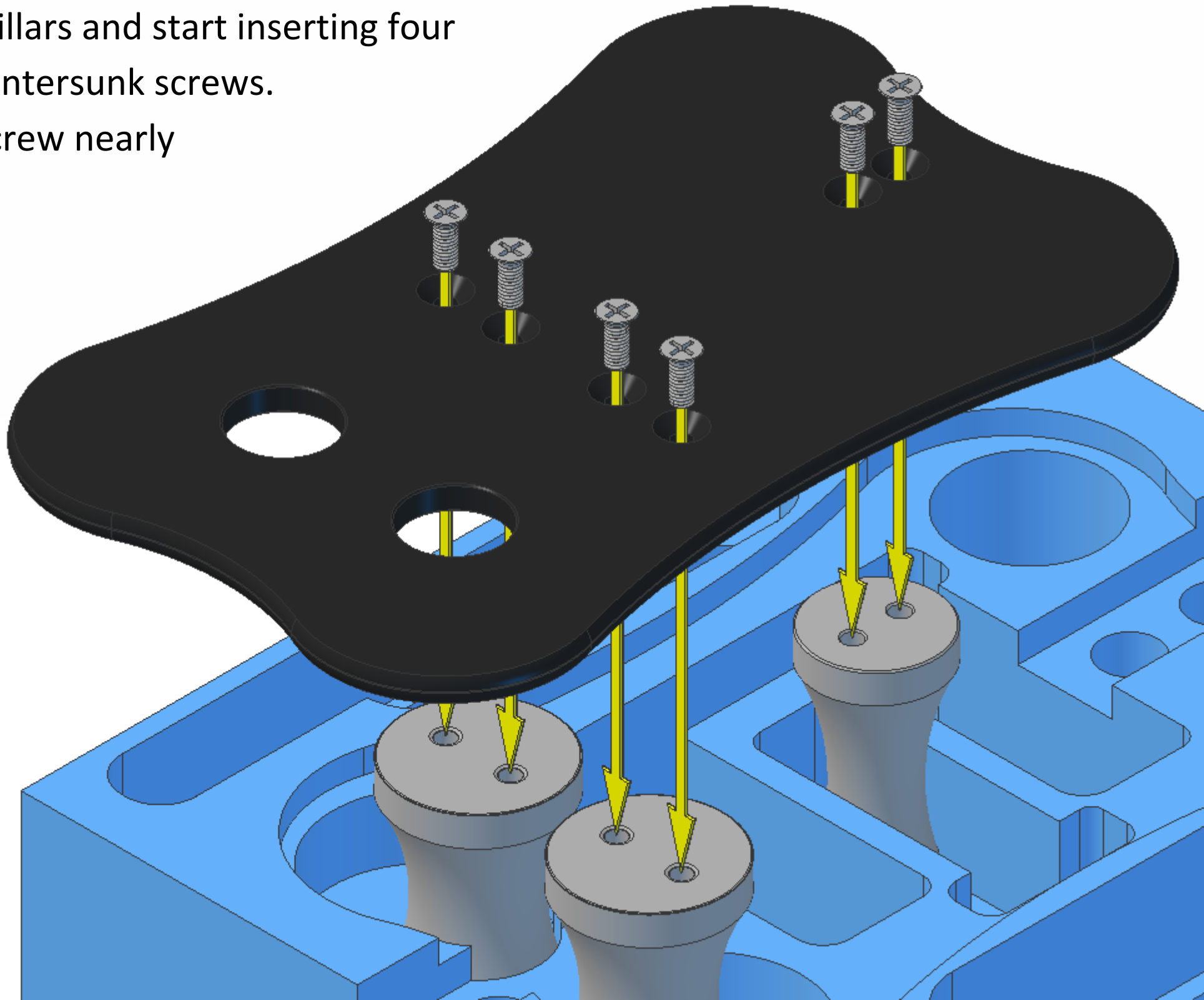
Align the two holes in the bottom face of the wheel pillar parallel with the side of the packing tray and push the pillar into the middle hole in the tray. This will hold it still and upright while you perform the next few assembly stages.



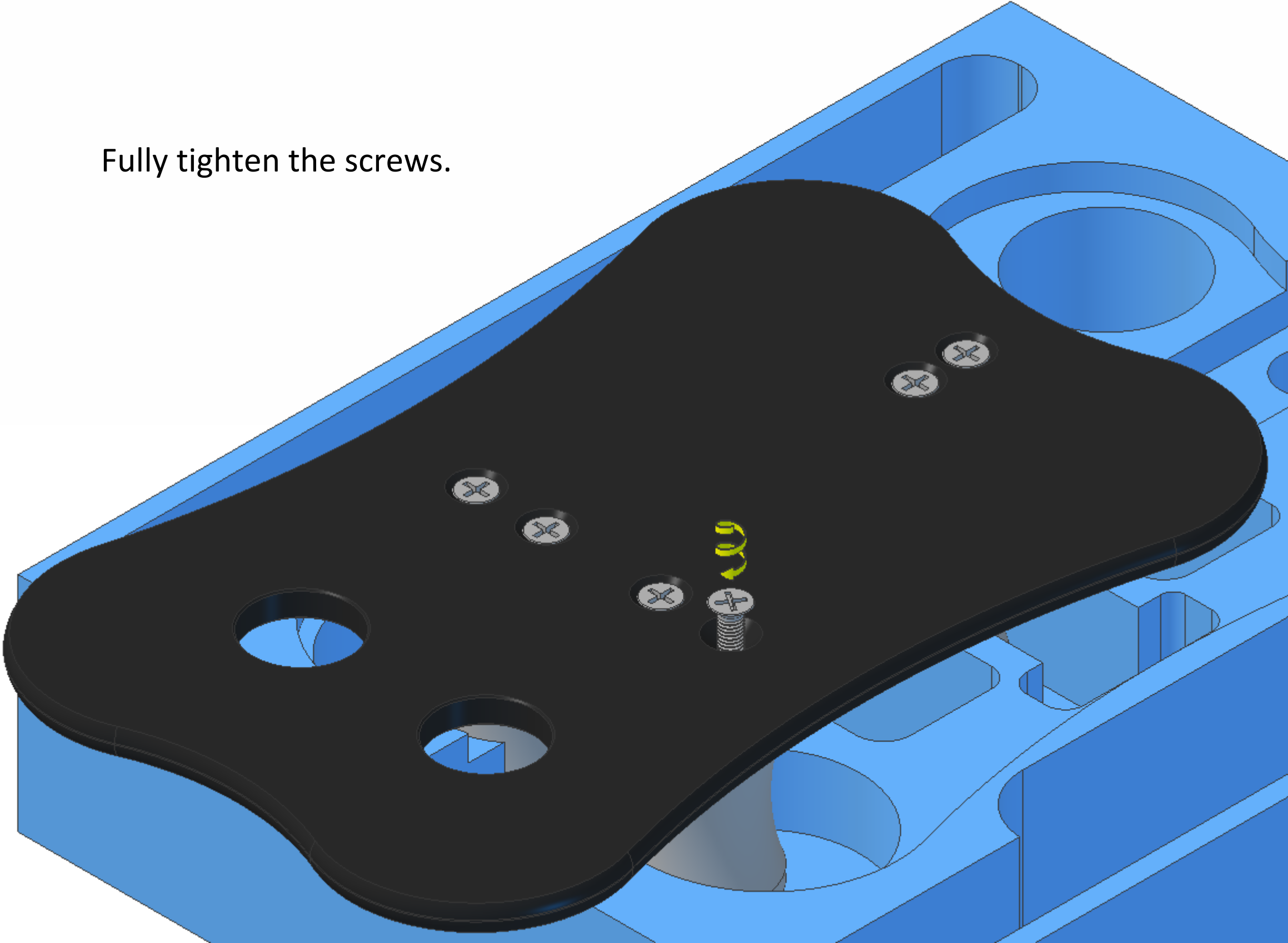
Locate the underside of the base plate. The underside is the side with the countersinks on the four holes as shown in the diagram.



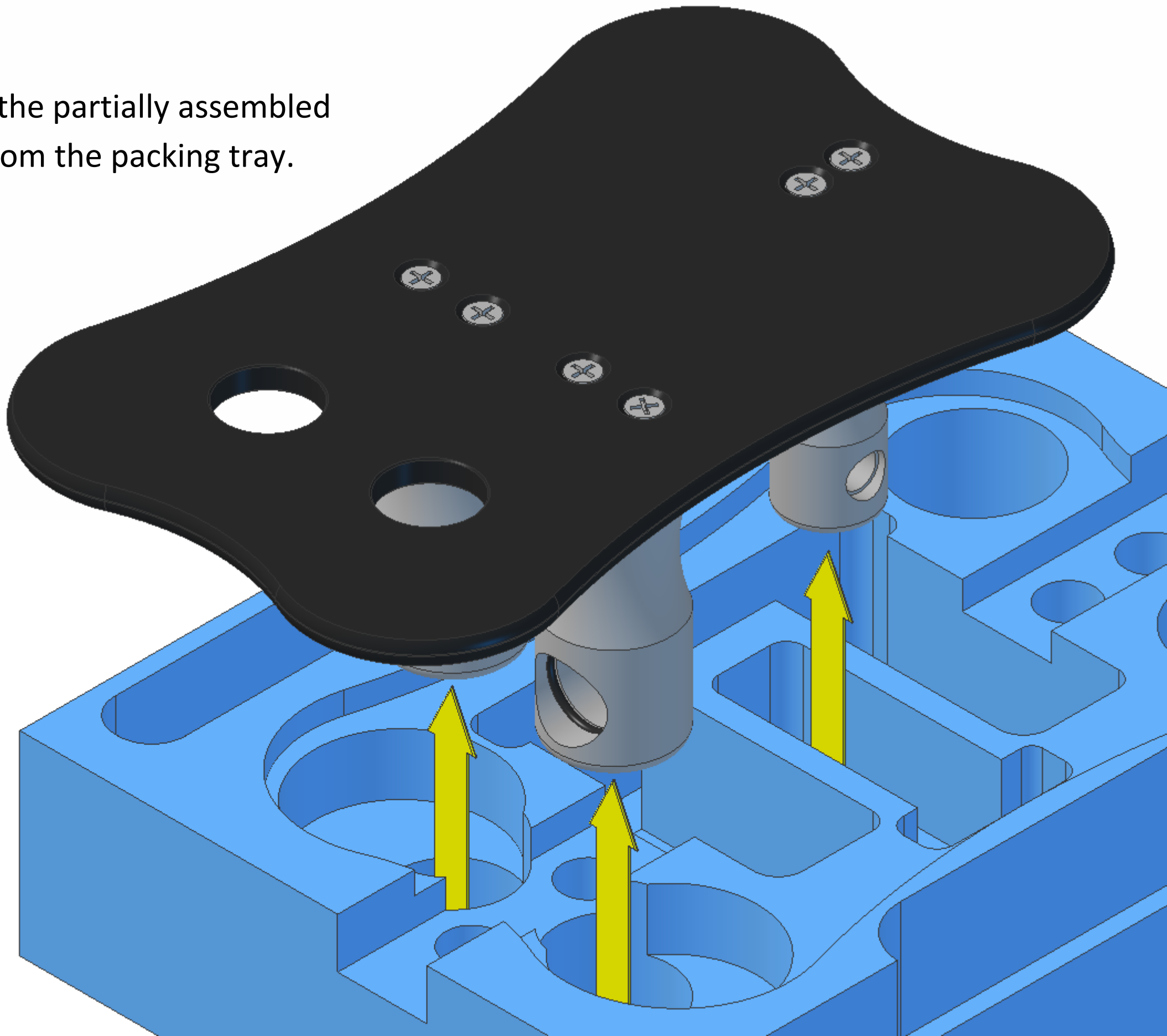
With the underside facing upwards, lower the base plate onto the pillars. Align the holes in the plate with the holes in the pillars and start inserting four M3x8mm countersunk screws. Screw each screw nearly all the way in.



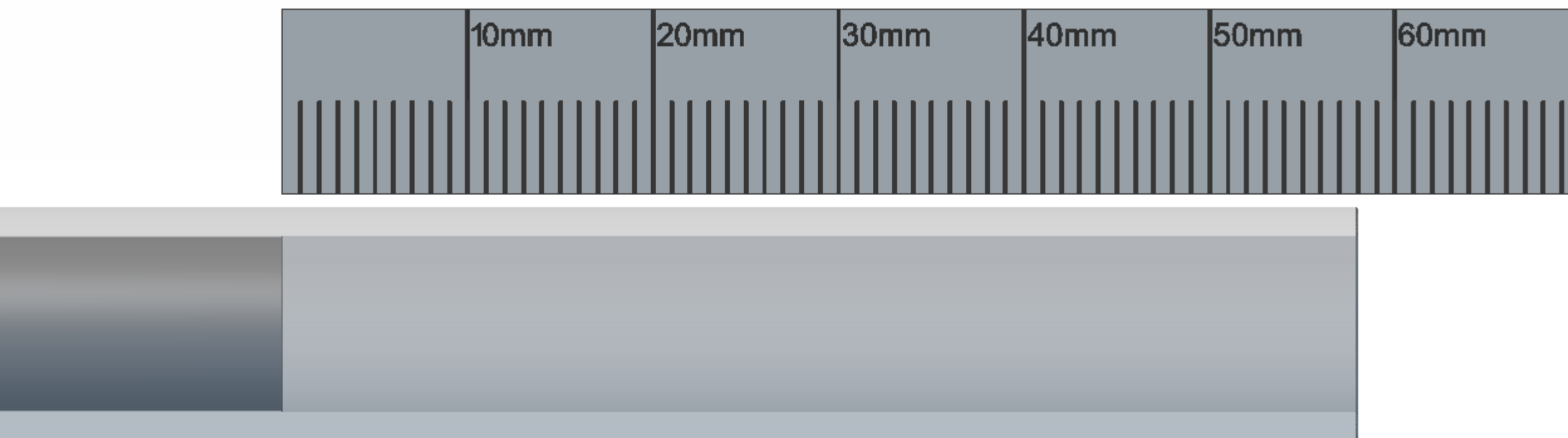
Fully tighten the screws.



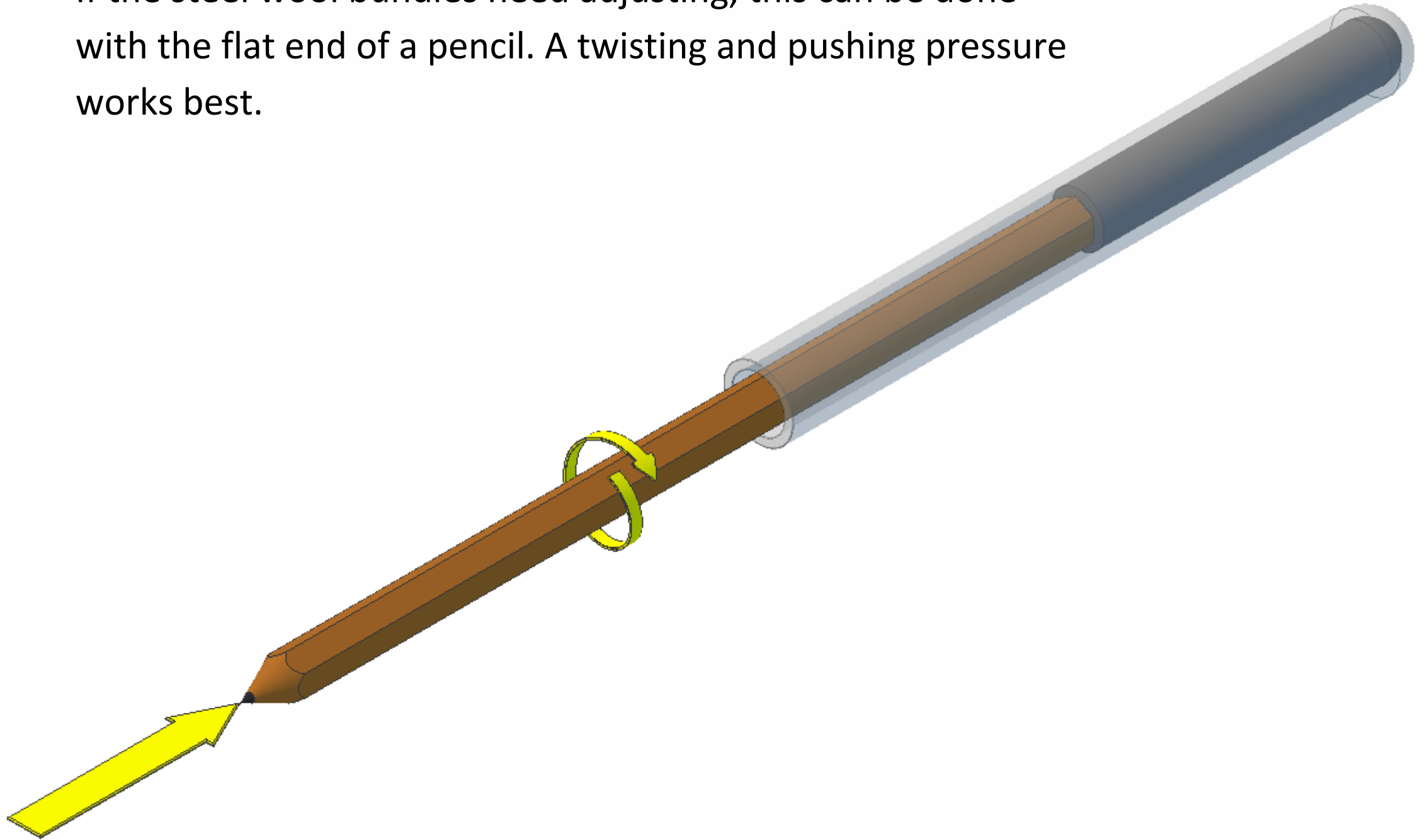
Remove the partially assembled engine from the packing tray.



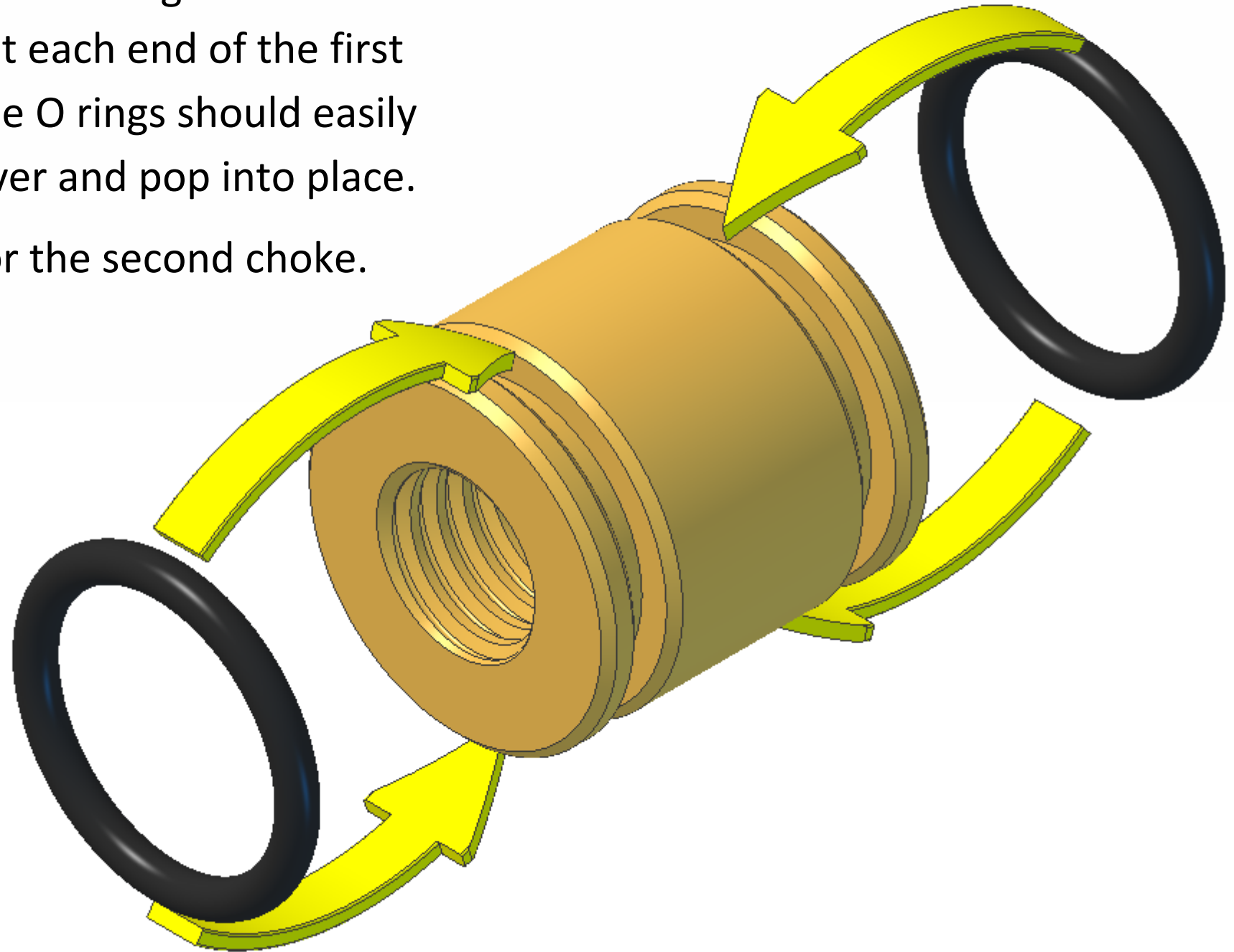
The glass tubes are supplied with the steel wool bundle pre-fitted, but they may need some final adjustment. The front of the wire wool bundles should be 58mm from the front of the tubes. Note, the front of the tube is to the right in the diagram.



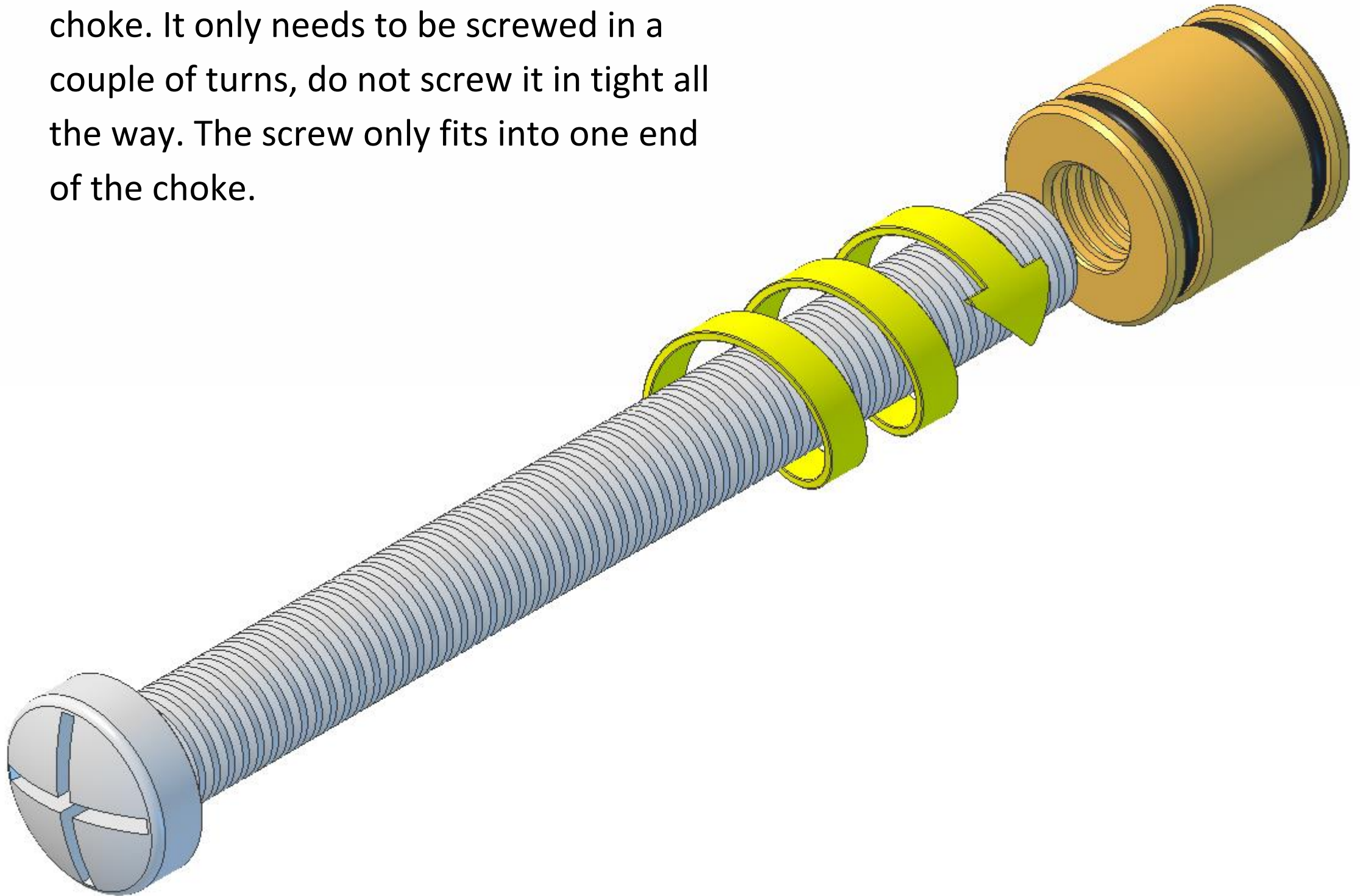
If the steel wool bundles need adjusting, this can be done with the flat end of a pencil. A twisting and pushing pressure works best.



Fit two 7mm O rings into the grooves at each end of the first choke. The O rings should easily stretch over and pop into place. Repeat for the second choke.

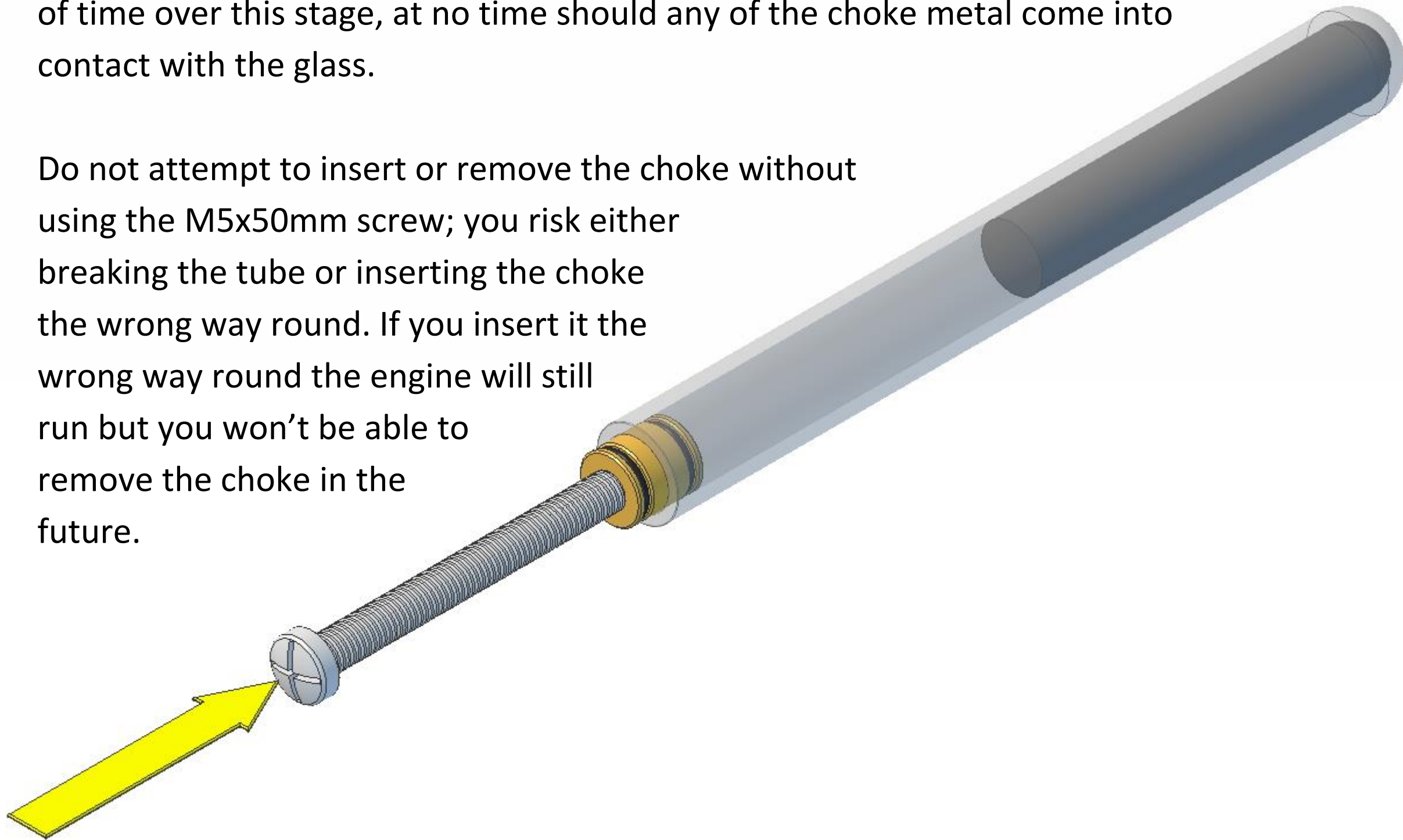


Screw the M5x50mm screw into the first choke. It only needs to be screwed in a couple of turns, do not screw it in tight all the way. The screw only fits into one end of the choke.

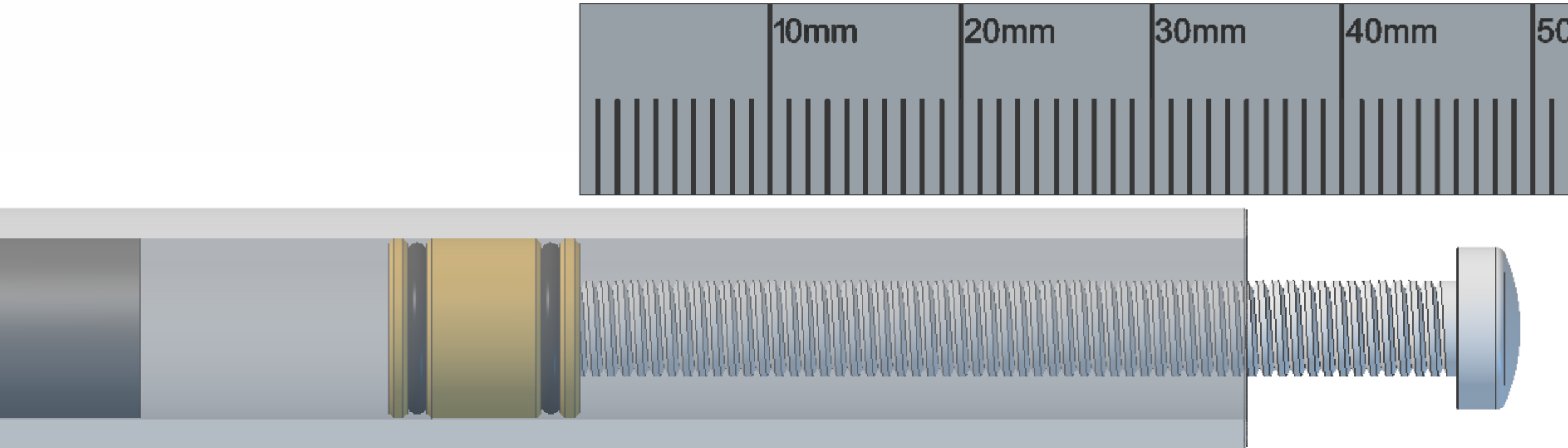


Moisten the two 7mm O rings sparingly with slightly soapy tap water to lubricate them and very carefully insert the gland into the first tube. Take plenty of time over this stage, at no time should any of the choke metal come into contact with the glass.

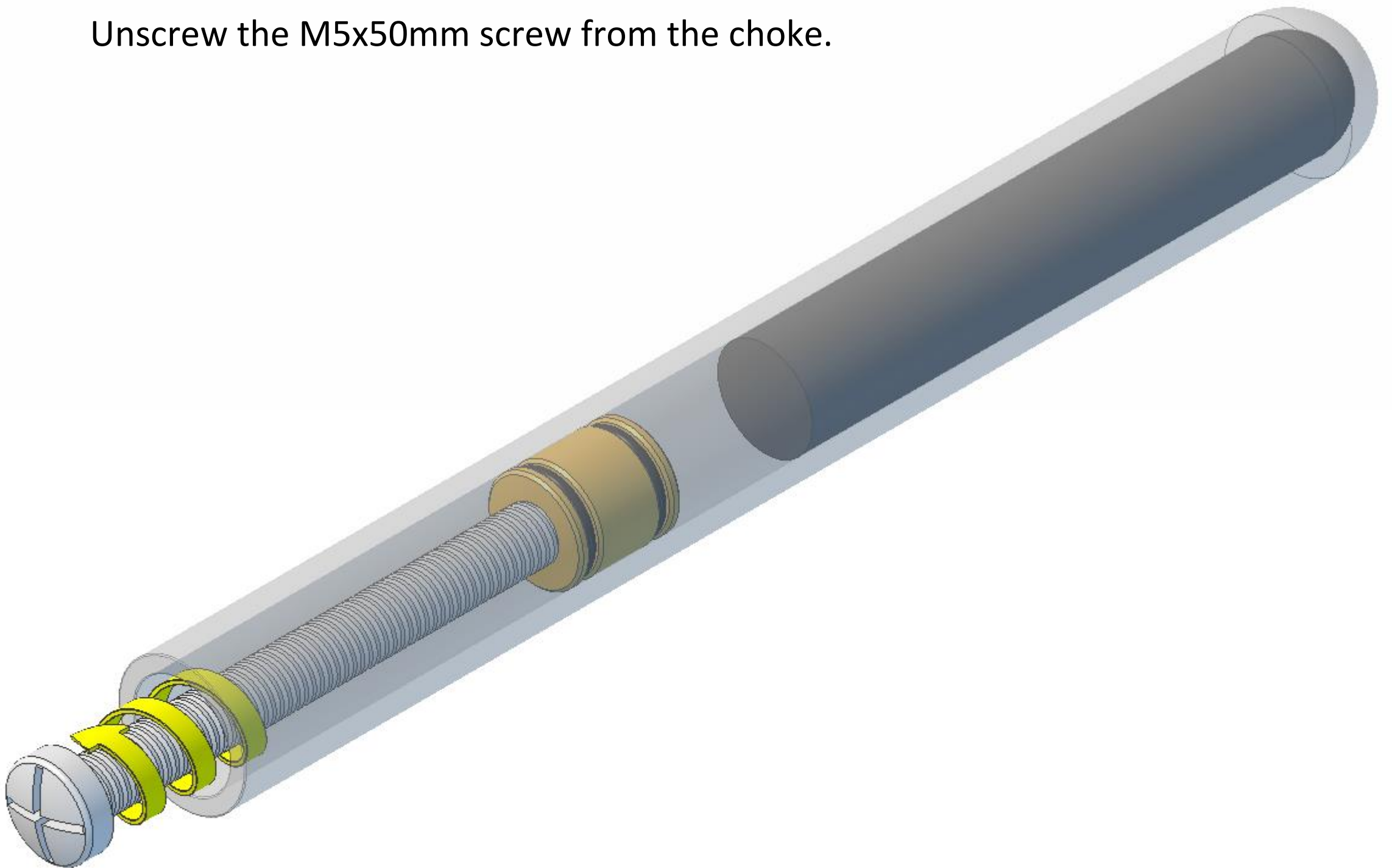
Do not attempt to insert or remove the choke without using the M5x50mm screw; you risk either breaking the tube or inserting the choke the wrong way round. If you insert it the wrong way round the engine will still run but you won't be able to remove the choke in the future.



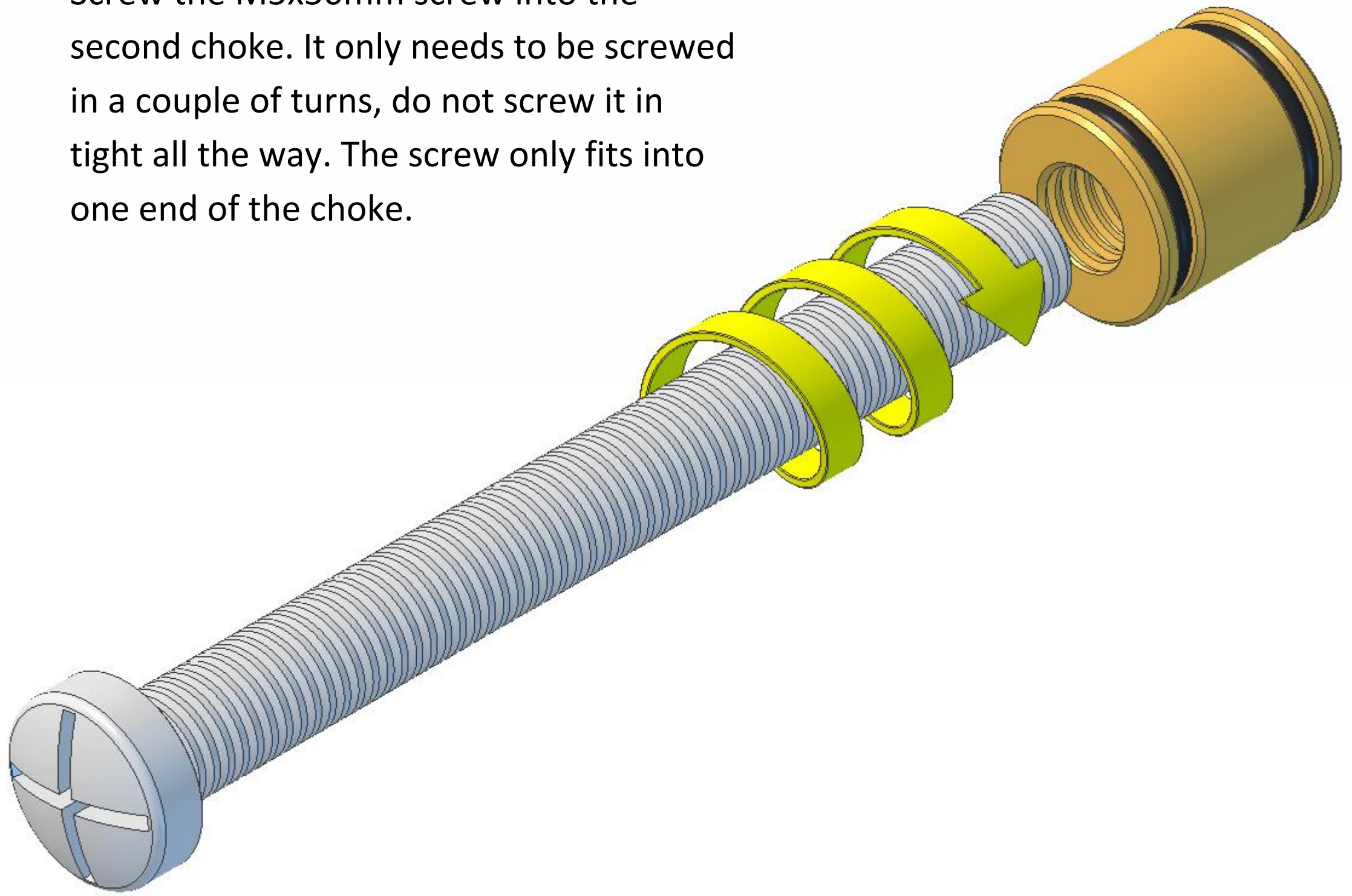
Push the choke in with the M5x50mm screw until the front of the choke is 35mm from the front of the tube.



Unscrew the M5x50mm screw from the choke.

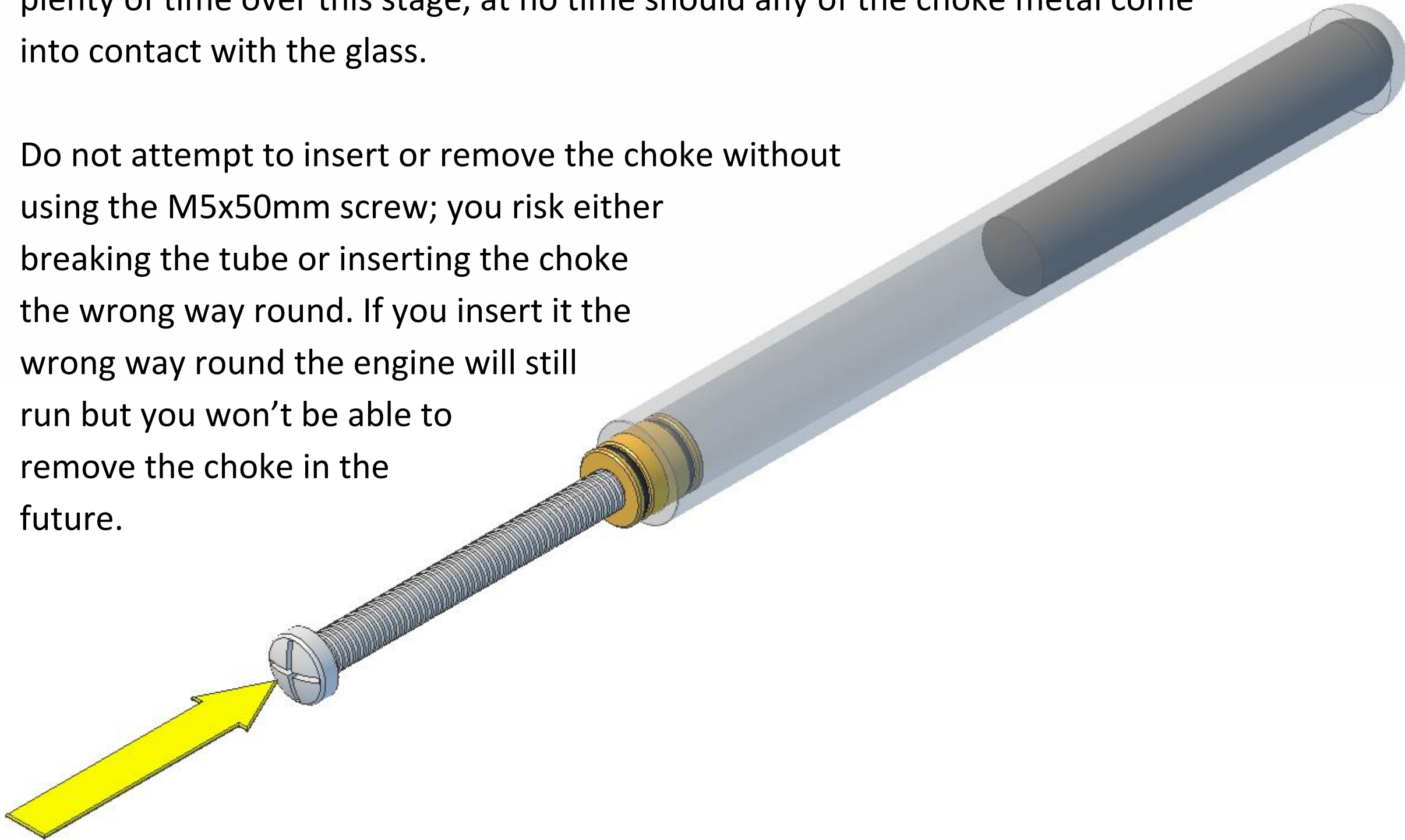


Screw the M5x50mm screw into the second choke. It only needs to be screwed in a couple of turns, do not screw it in tight all the way. The screw only fits into one end of the choke.

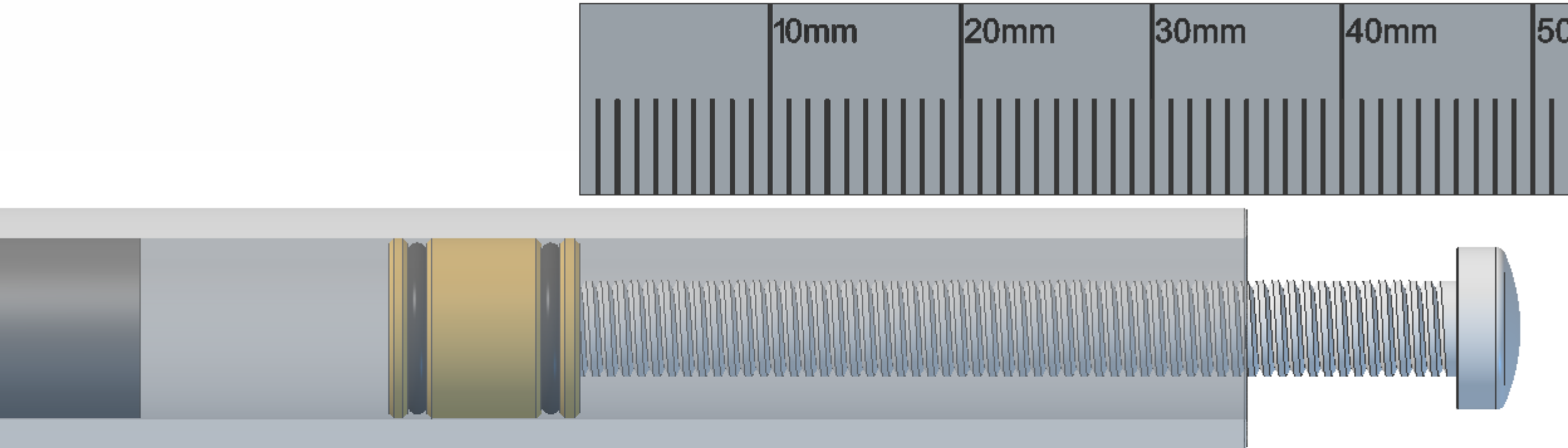


Moisten the two 7mm O rings sparingly with slightly soapy tap water to lubricate them and very carefully insert the gland into the second tube. Take plenty of time over this stage, at no time should any of the choke metal come into contact with the glass.

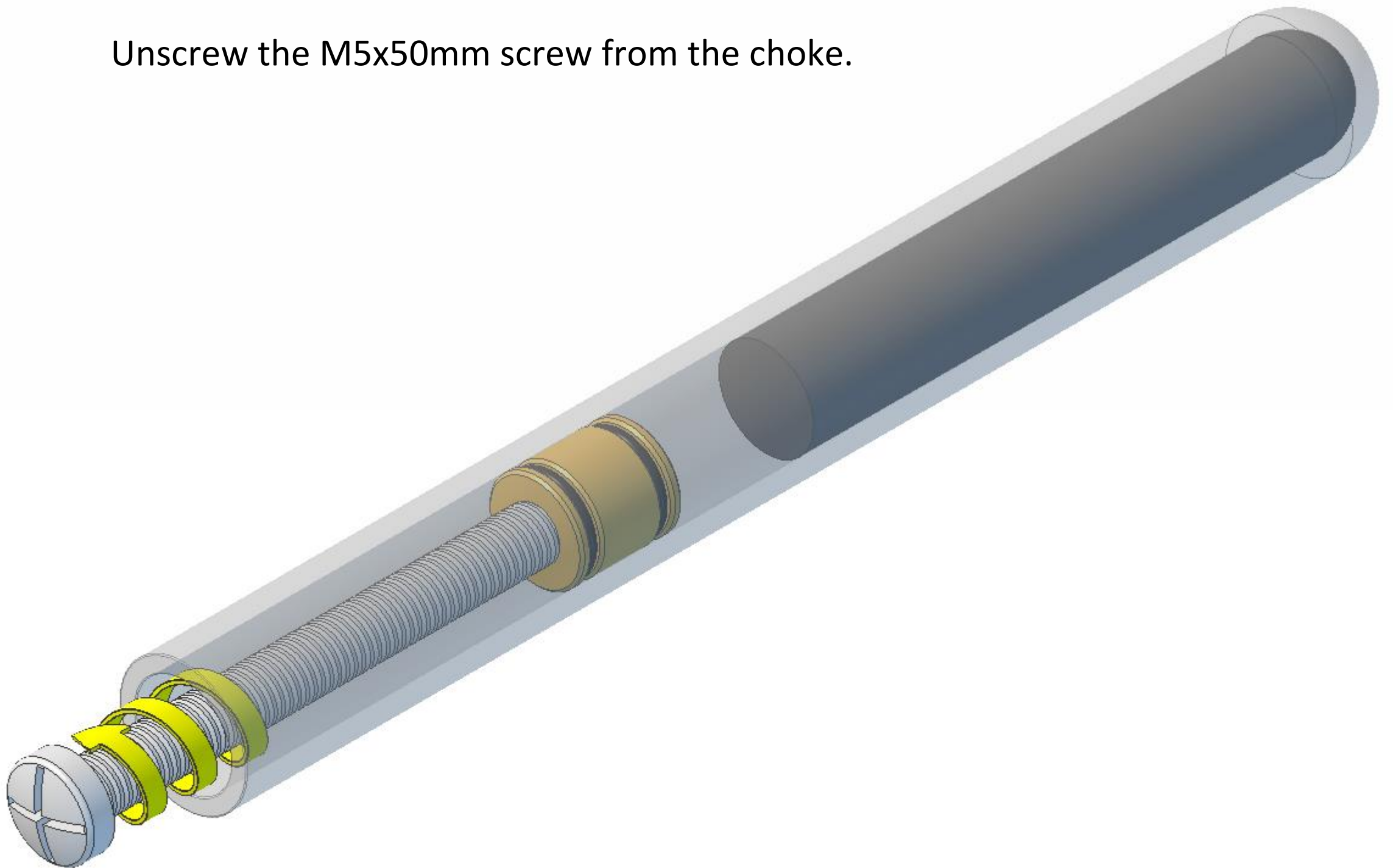
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Push the choke in with the M5x50mm screw until the front of the choke is 35mm from the front of the tube.

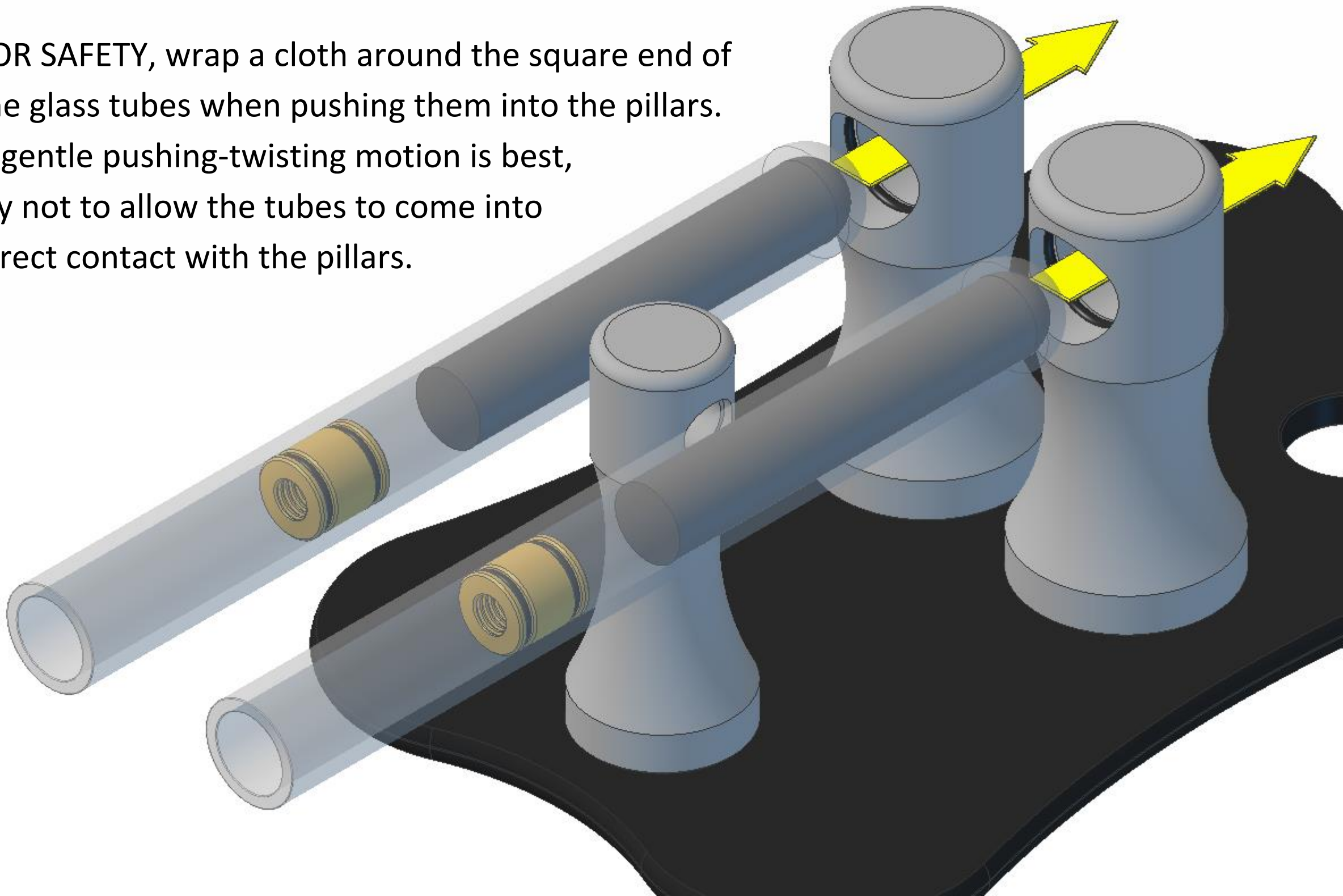


Unscrew the M5x50mm screw from the choke.

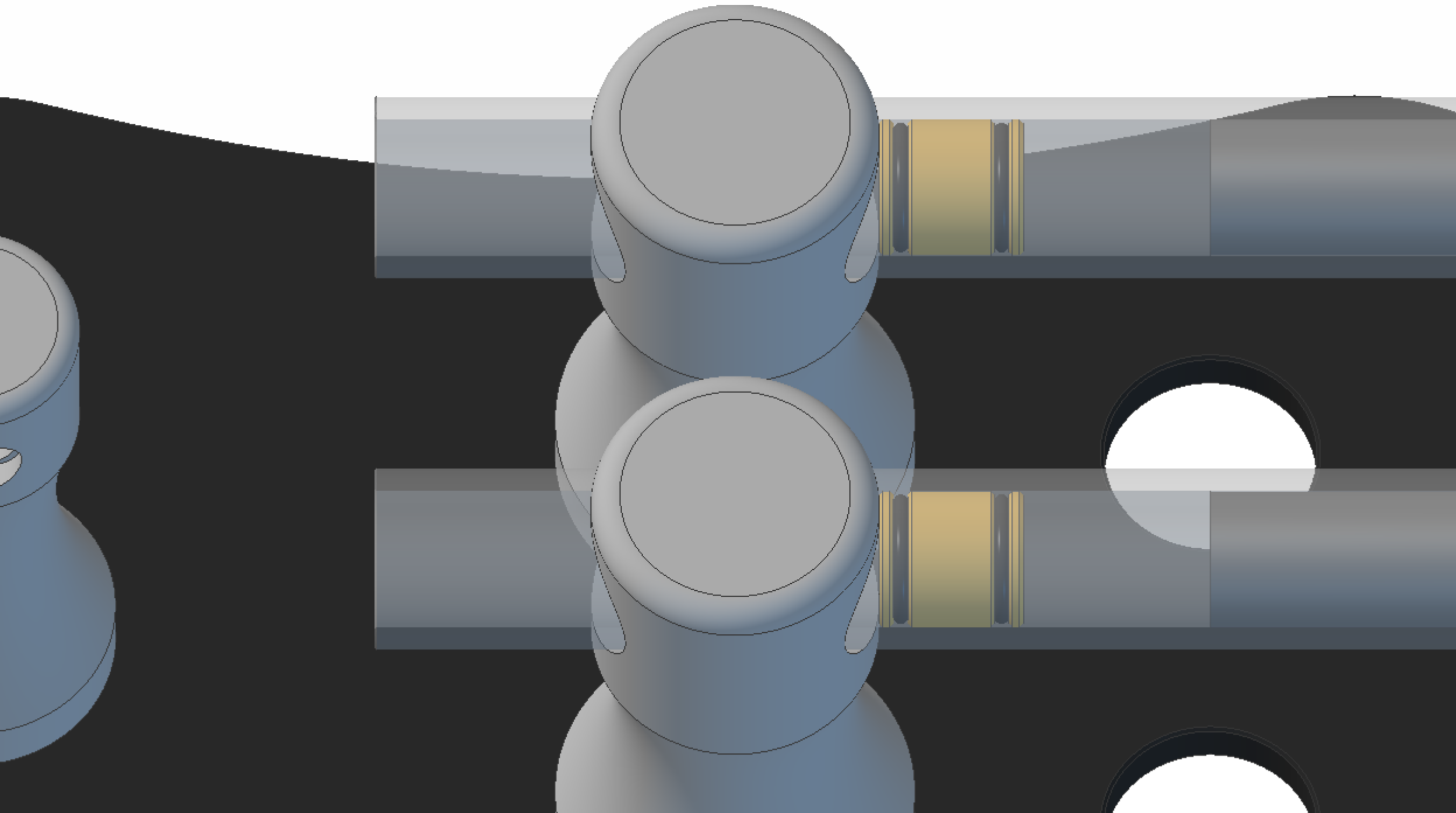


Moisten the two 12.5mm O rings in each of the tube pillars sparingly with slightly soapy tap water for lubrication and push the tubes into the holes in the pillars.

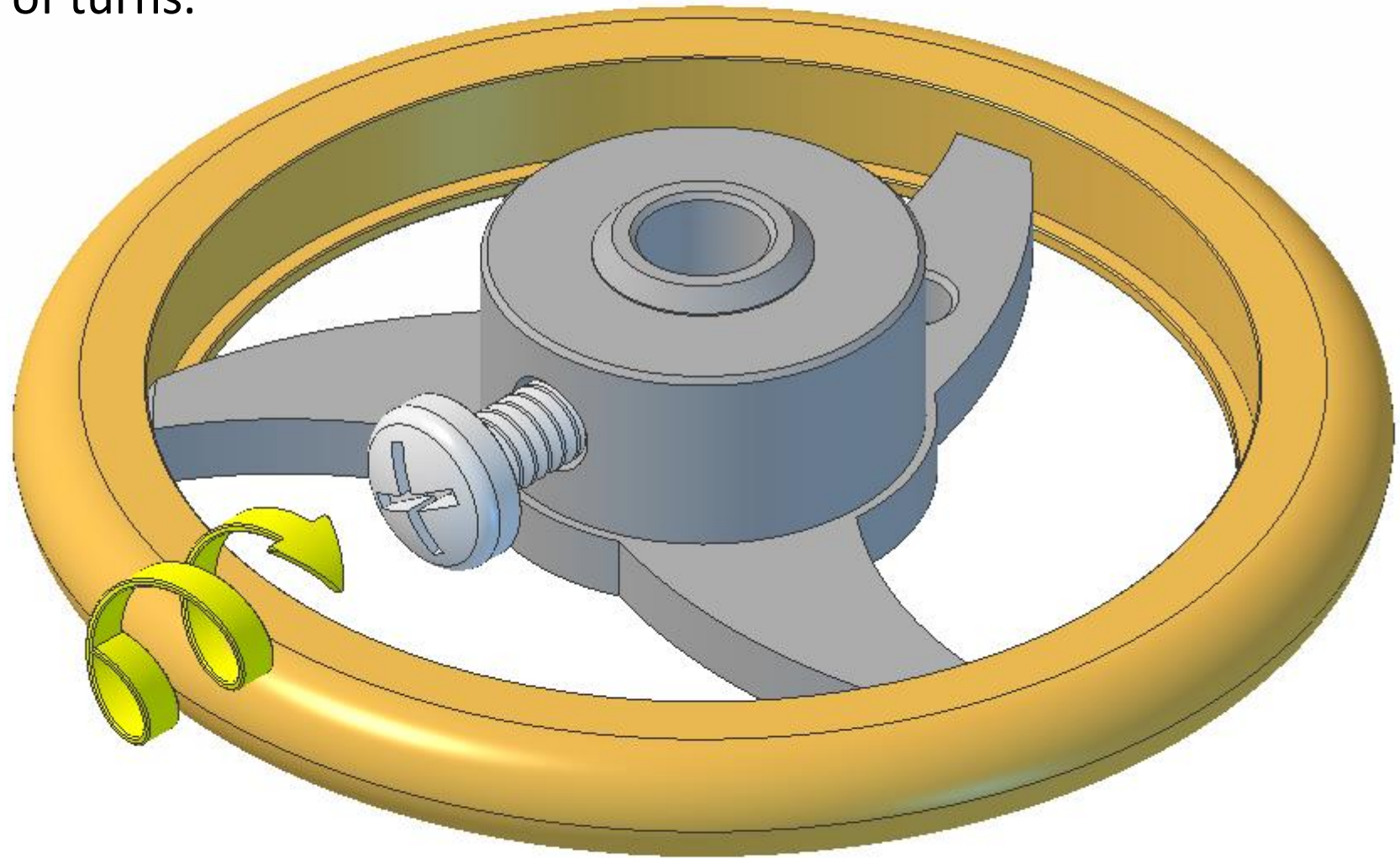
FOR SAFETY, wrap a cloth around the square end of the glass tubes when pushing them into the pillars. A gentle pushing-twisting motion is best, try not to allow the tubes to come into direct contact with the pillars.



Push the glass tubes in until the front faces of the chokes line up with the back edges of the tube pillars. If you have difficulty inserting the glass tubes into the pillars with the pillars attached to the base plate you can temporarily remove the pillars from the plate, fit the tubes and then re-fit the pillars to the plate.

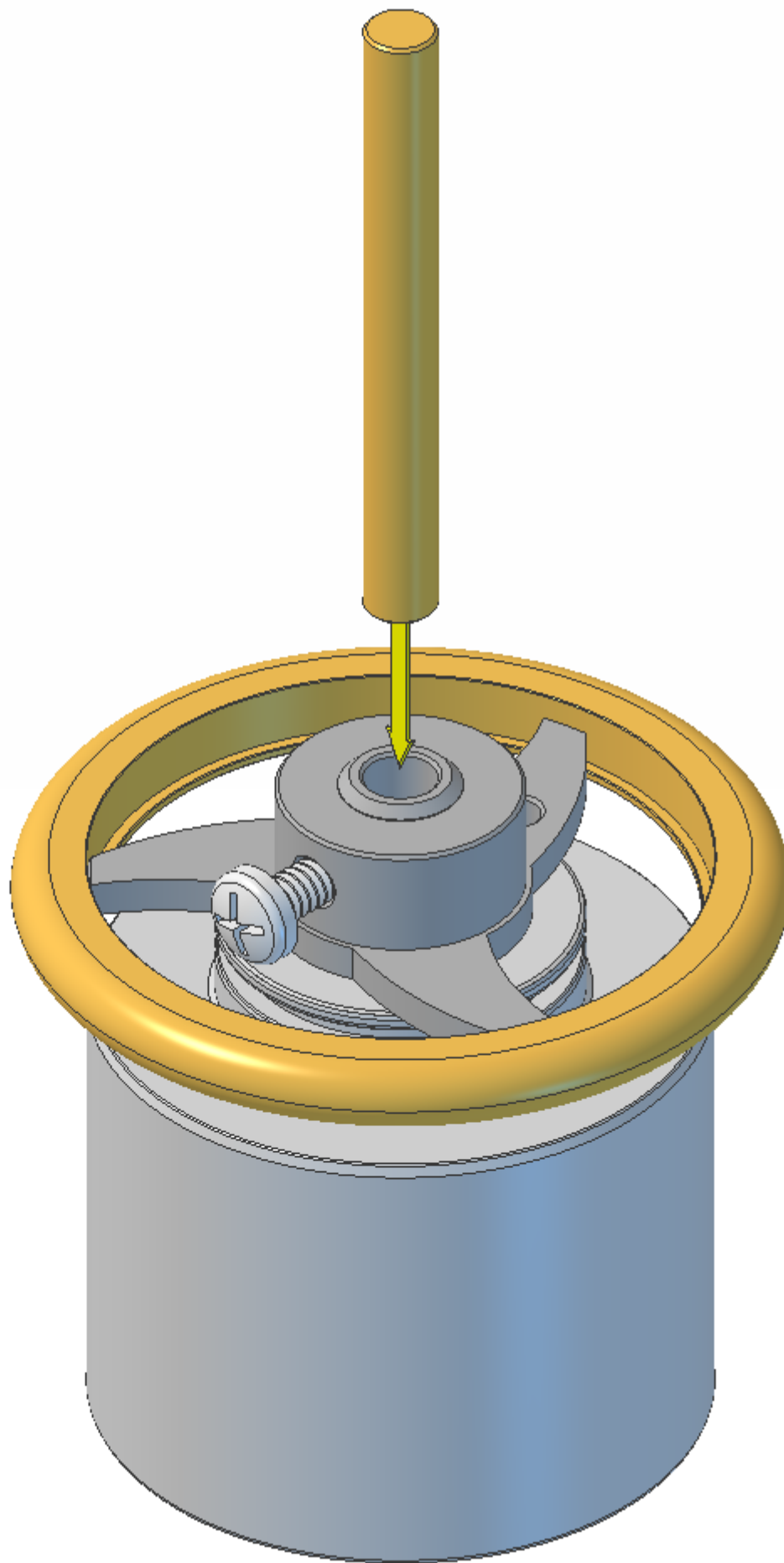


Screw one M2x4mm roundhead screw into the side of the first flywheel a couple of turns.

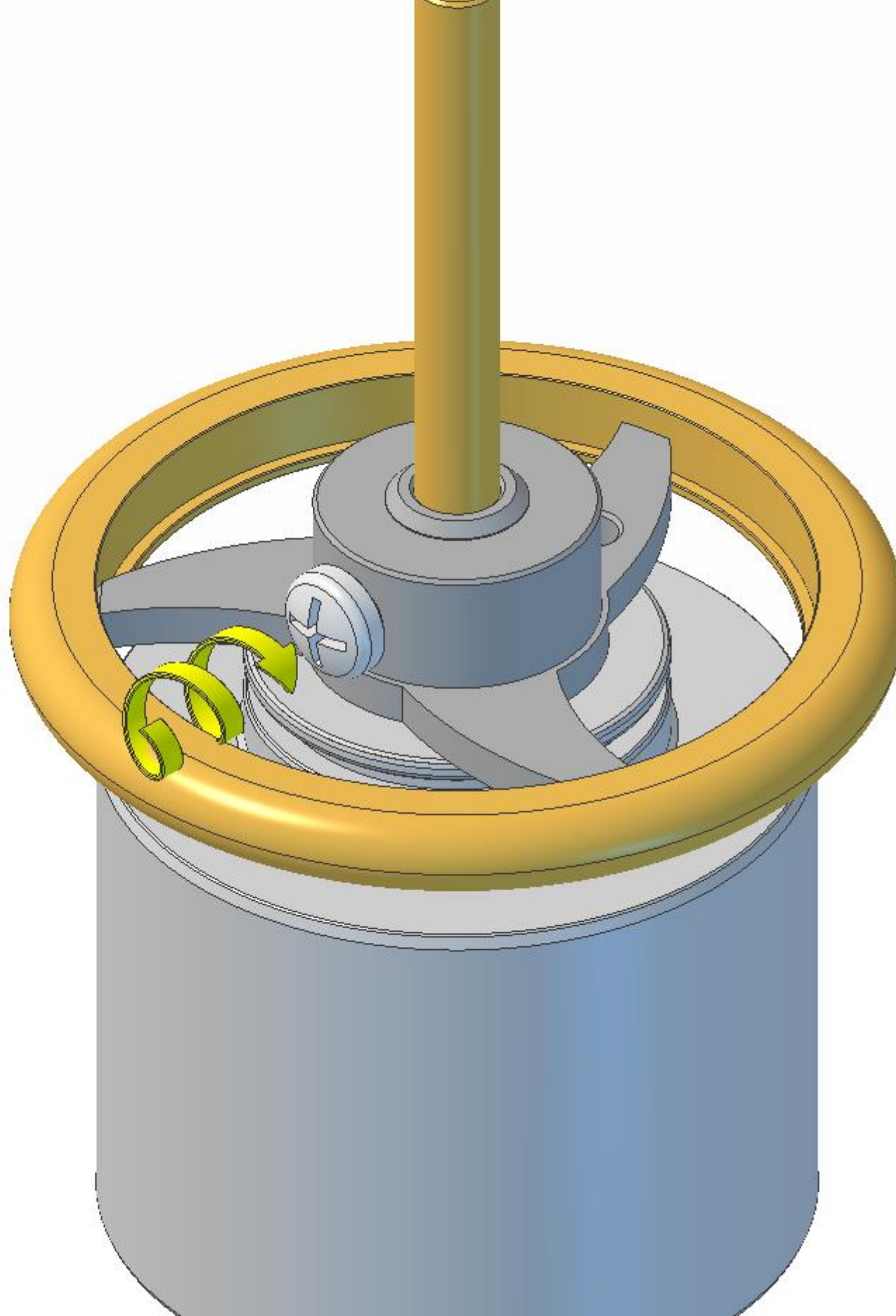


Put a burner body upside down on your work surface and place the first flywheel flat side down on it. Fit the axle into the flywheel and push it down flat onto the burner body.

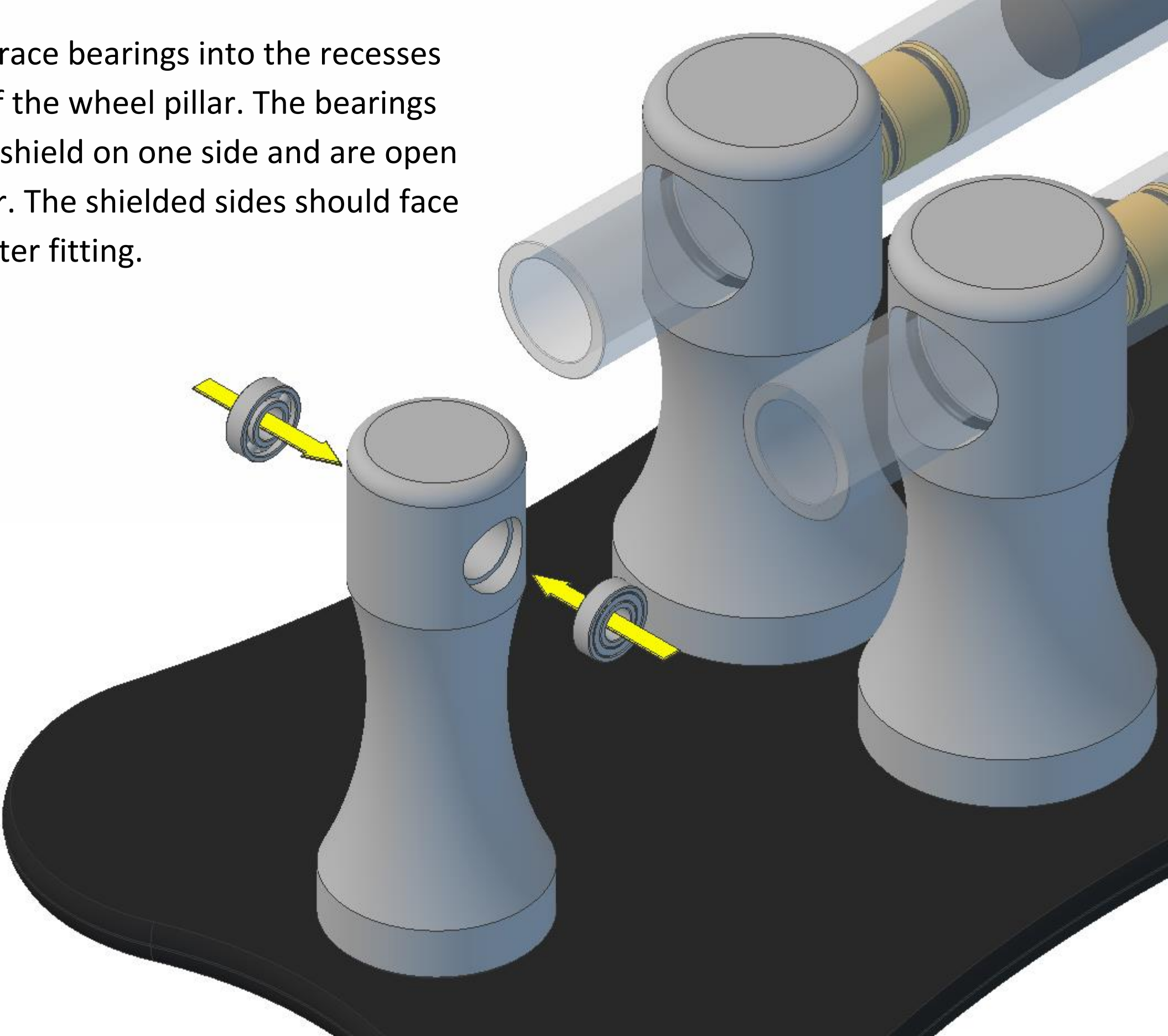
The purpose of this operation is to make sure that the ends of the axle and flywheel line up flush with each other.



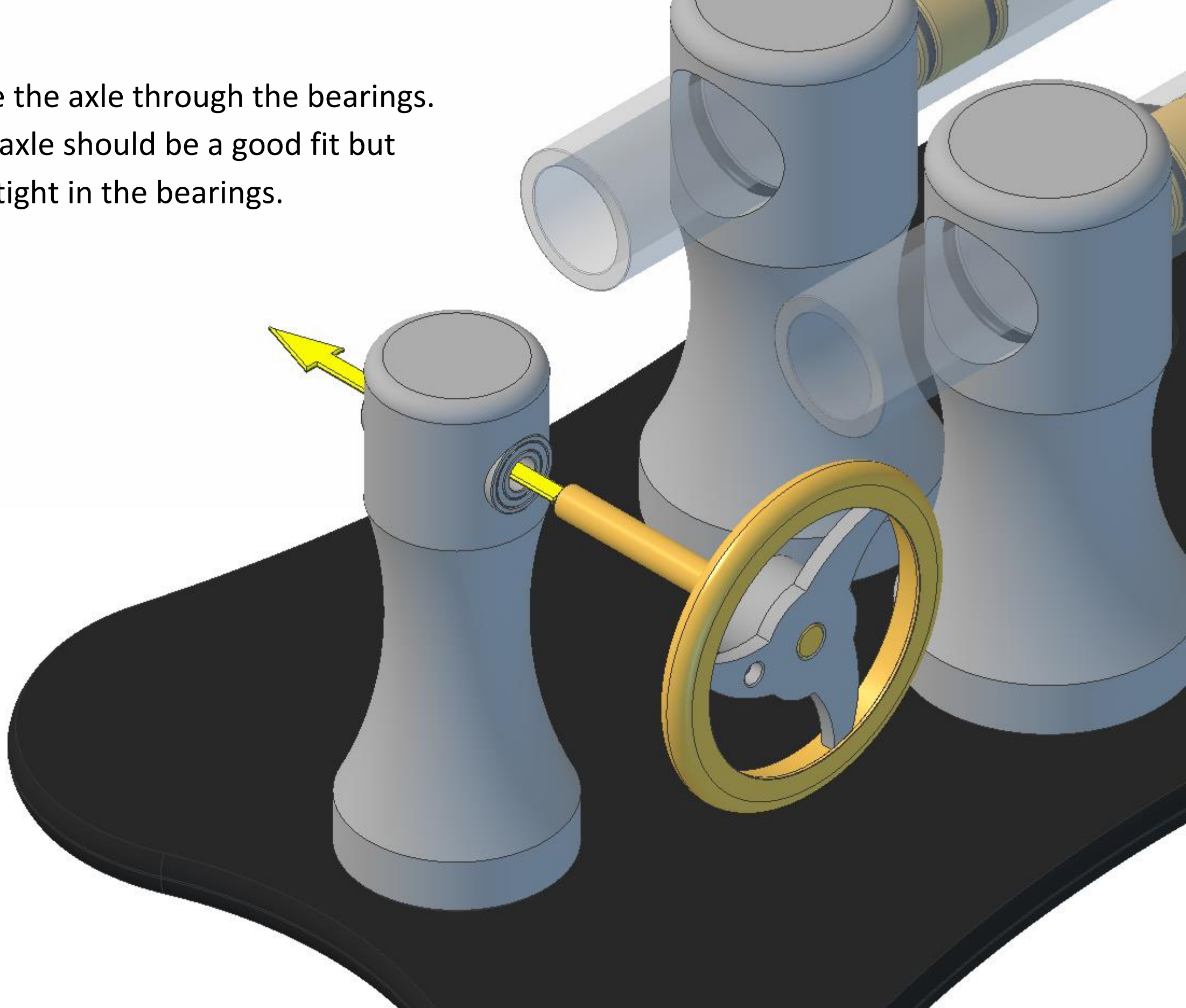
Fully tighten the screw.



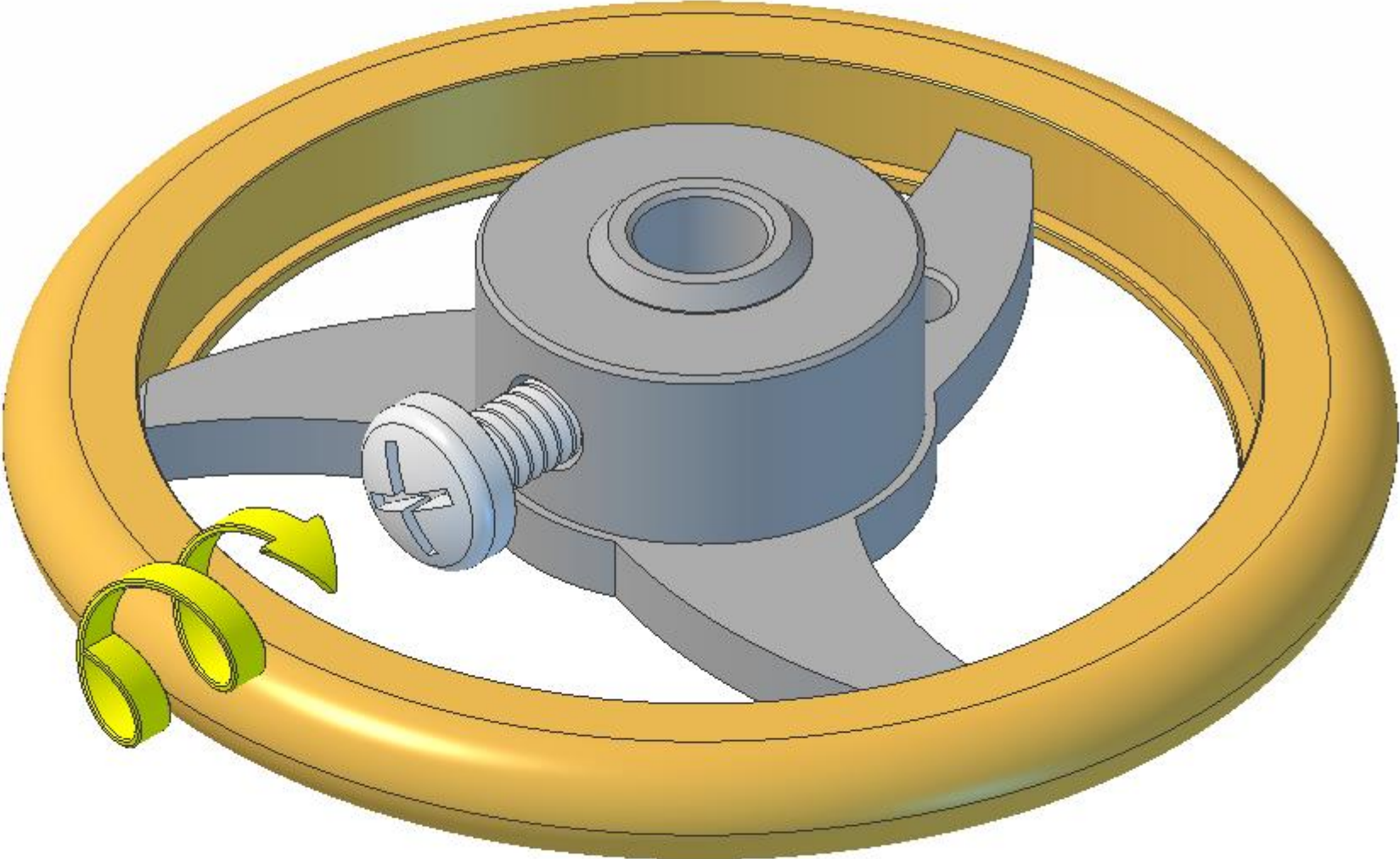
Fit two ball-race bearings into the recesses in the top of the wheel pillar. The bearings have a dust shield on one side and are open on the other. The shielded sides should face outwards after fitting.



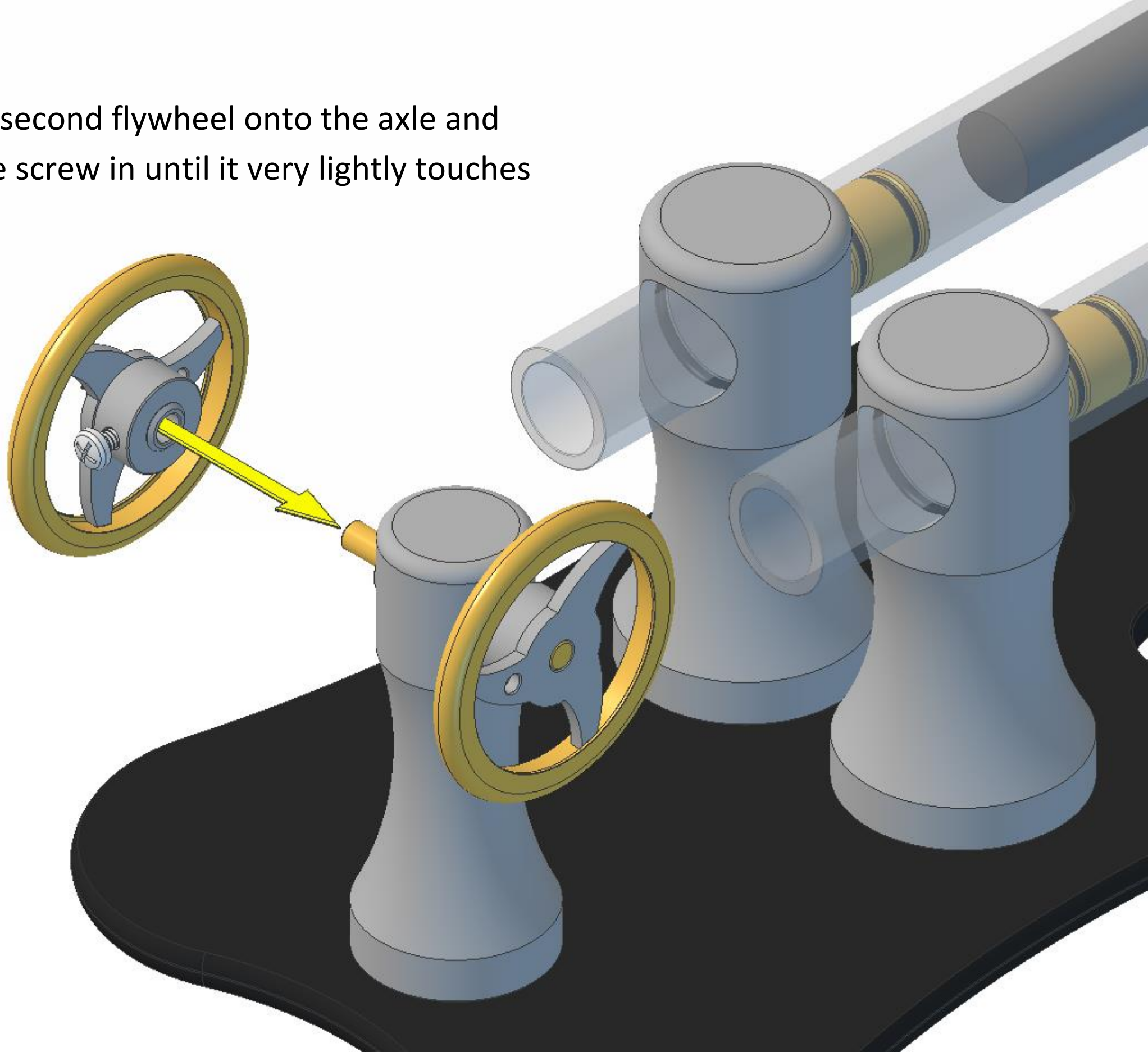
Slide the axle through the bearings.
The axle should be a good fit but
not tight in the bearings.



Screw one M2x4mm roundhead screw into the side of the second flywheel a couple of turns.

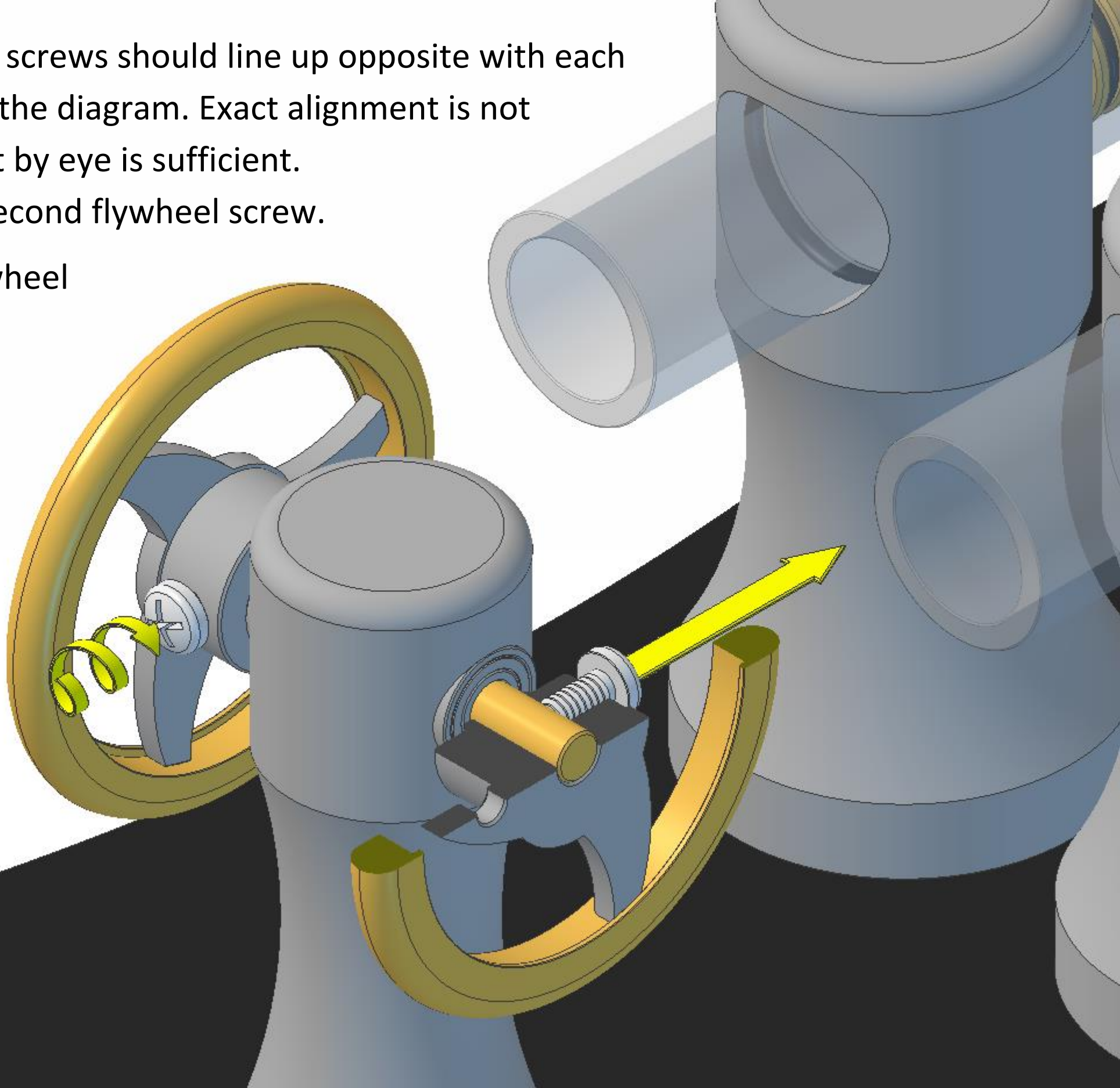


Slide the second flywheel onto the axle and screw the screw in until it very lightly touches the axle.

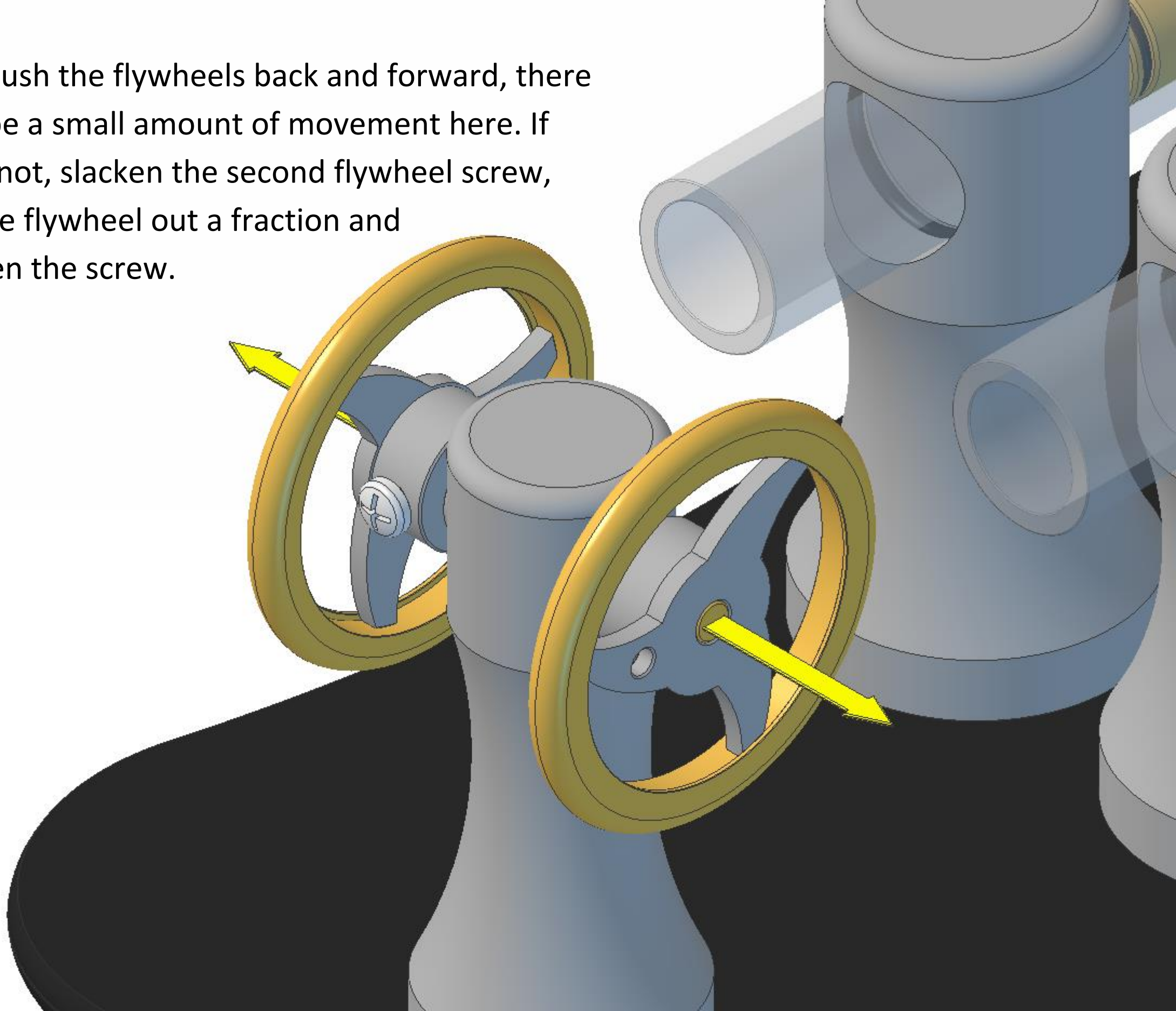


The two M2x4mm screws should line up opposite with each other as shown in the diagram. Exact alignment is not needed, alignment by eye is sufficient. Fully tighten the second flywheel screw.

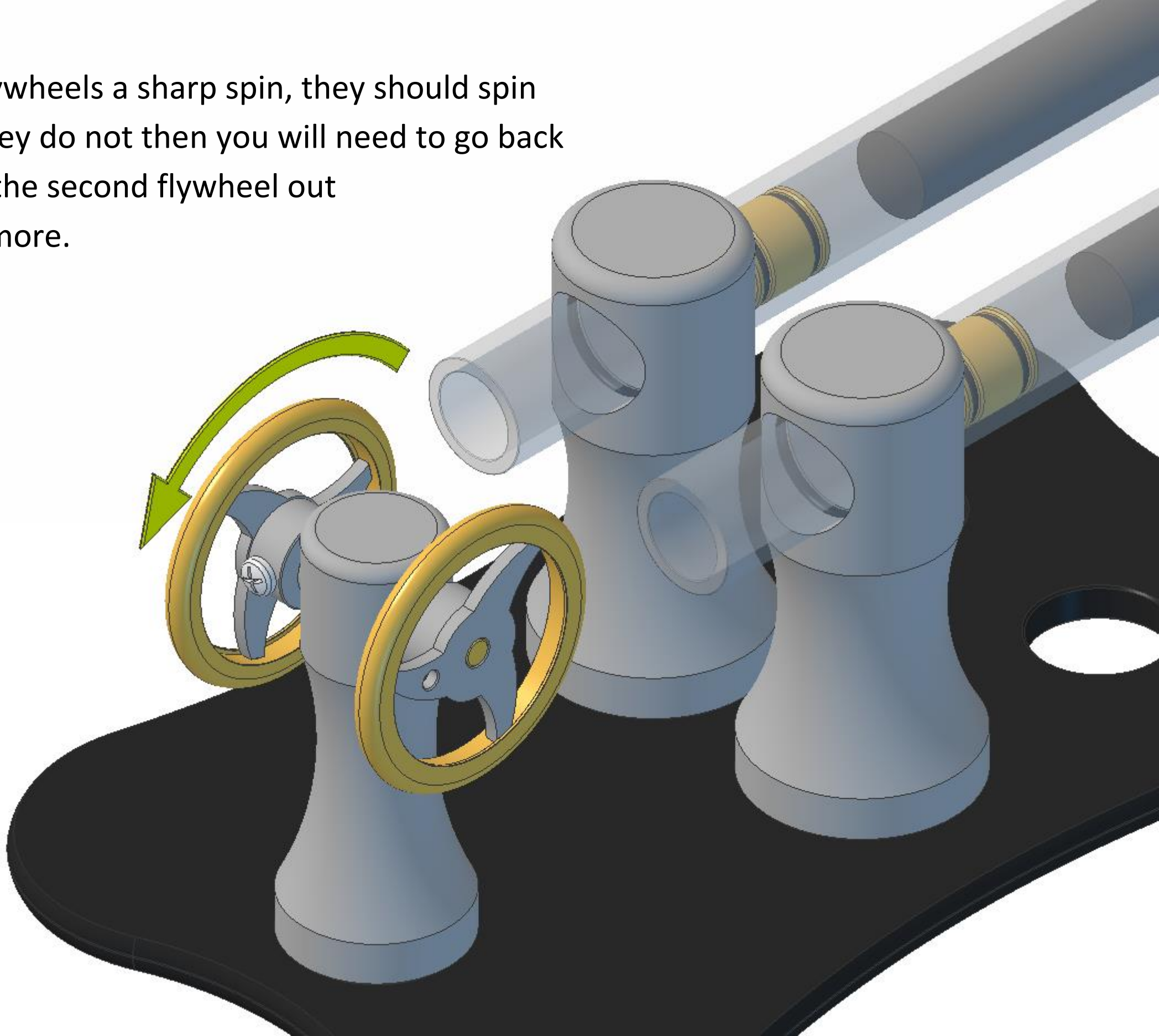
Note, the first flywheel is shown cut away for clarity.



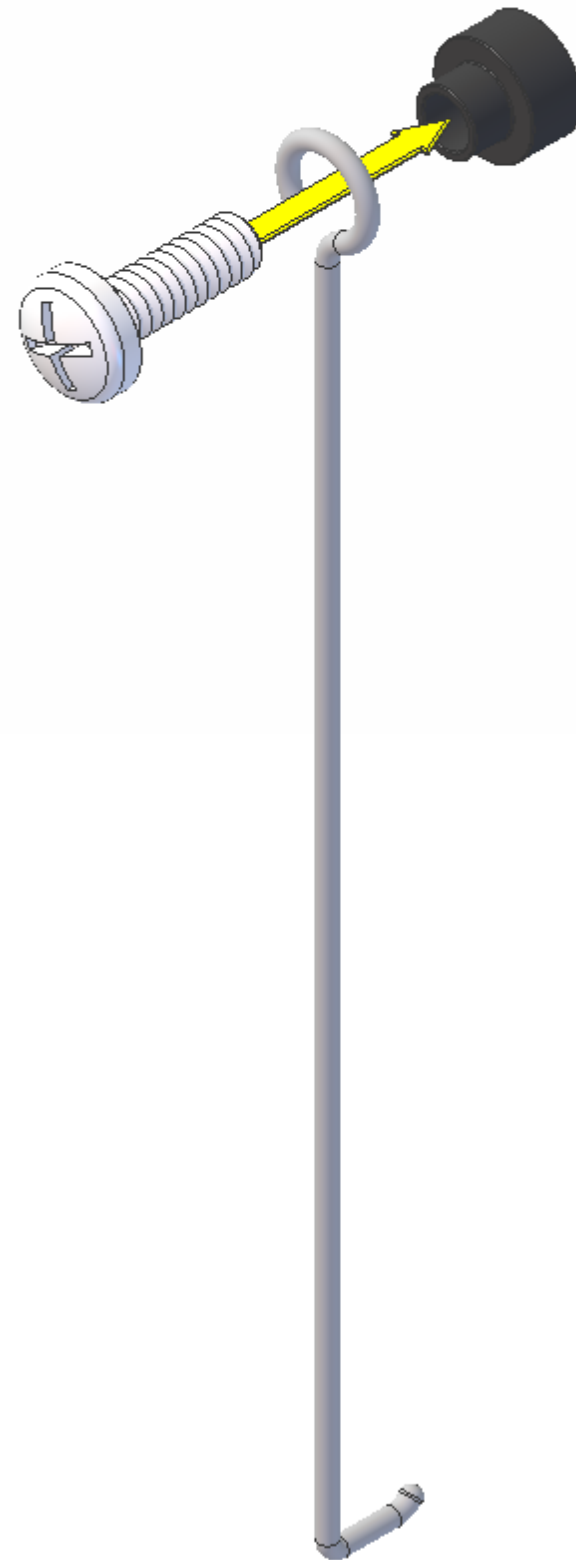
Gently push the flywheels back and forward, there should be a small amount of movement here. If there is not, slacken the second flywheel screw, move the flywheel out a fraction and re-tighten the screw.



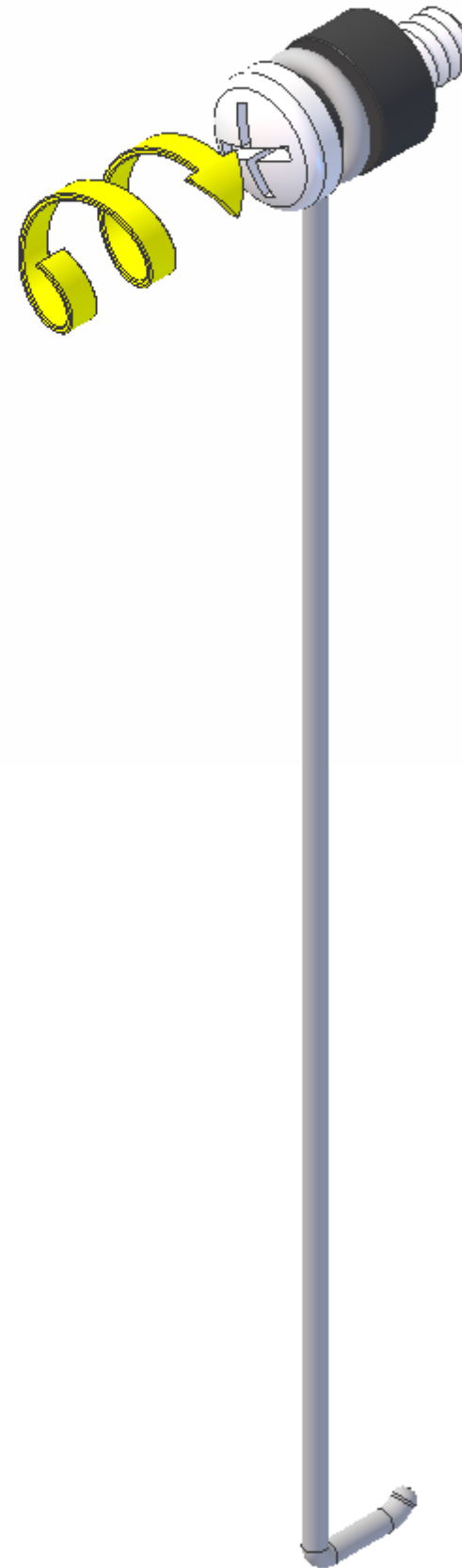
Give the flywheels a sharp spin, they should spin freely. If they do not then you will need to go back and move the second flywheel out a fraction more.



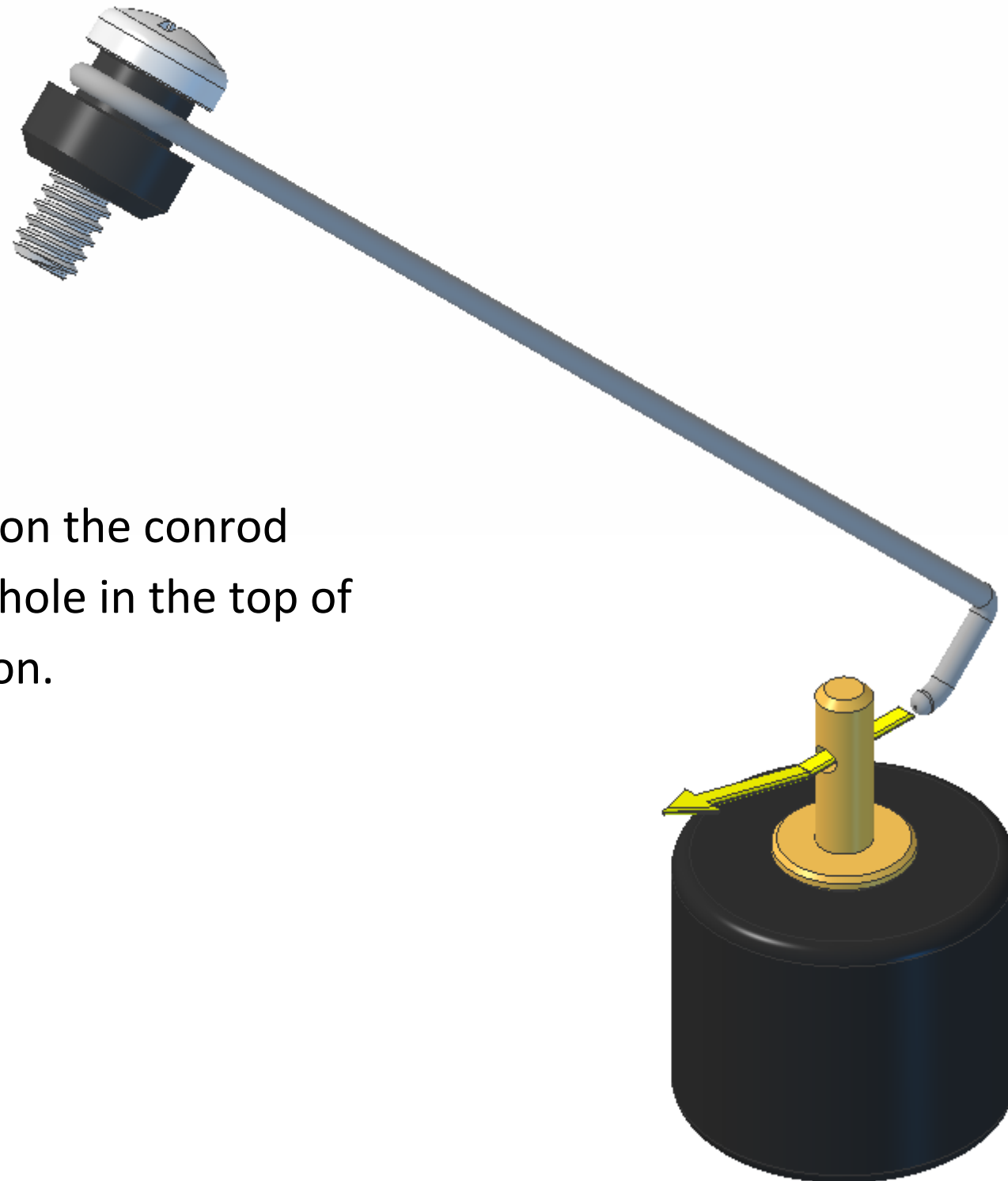
Fit one conrod onto one conrod bush and secure with one M2x6mm roundhead screw. The screw only needs screwing in a couple of turns at this stage. Note, the hook on the bottom of the conrod should be aligned as shown in the diagram.



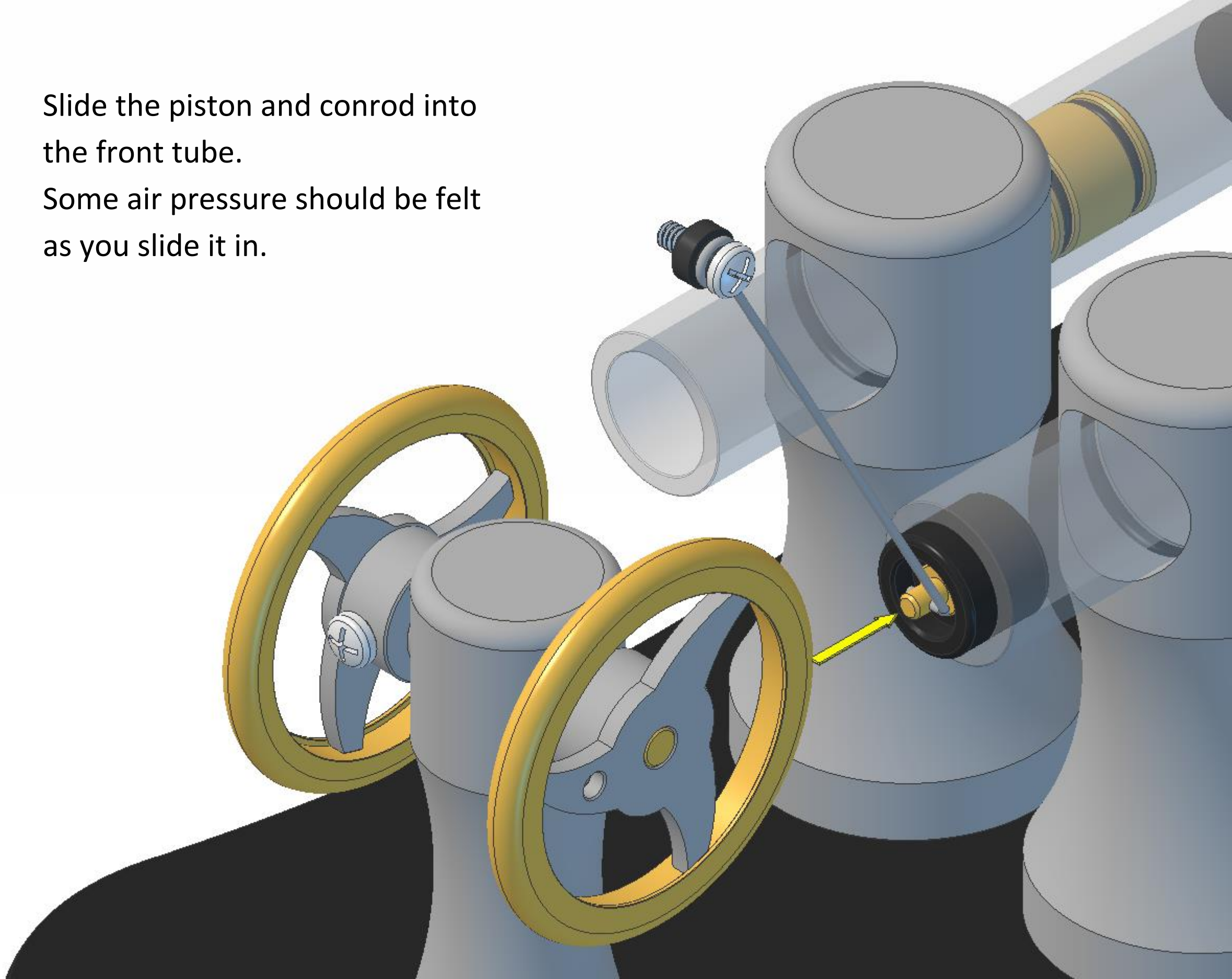
Screw the screw in until it *just* touches the bush. Do not over-tighten or you could cause the bush to expand and pinch the conrod eye, which could prevent your engine from running.



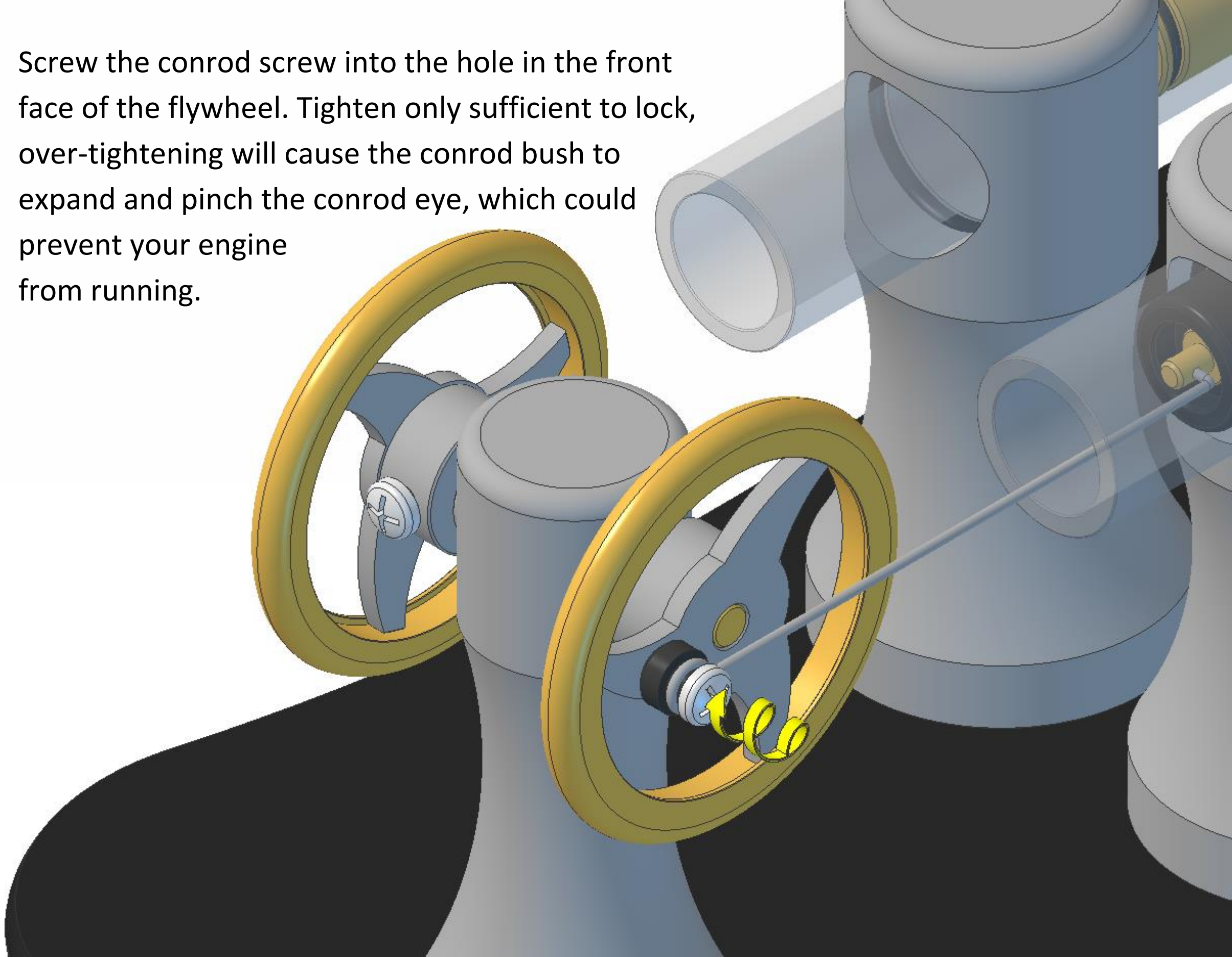
Fit the hook on the conrod through the hole in the top of the first piston.



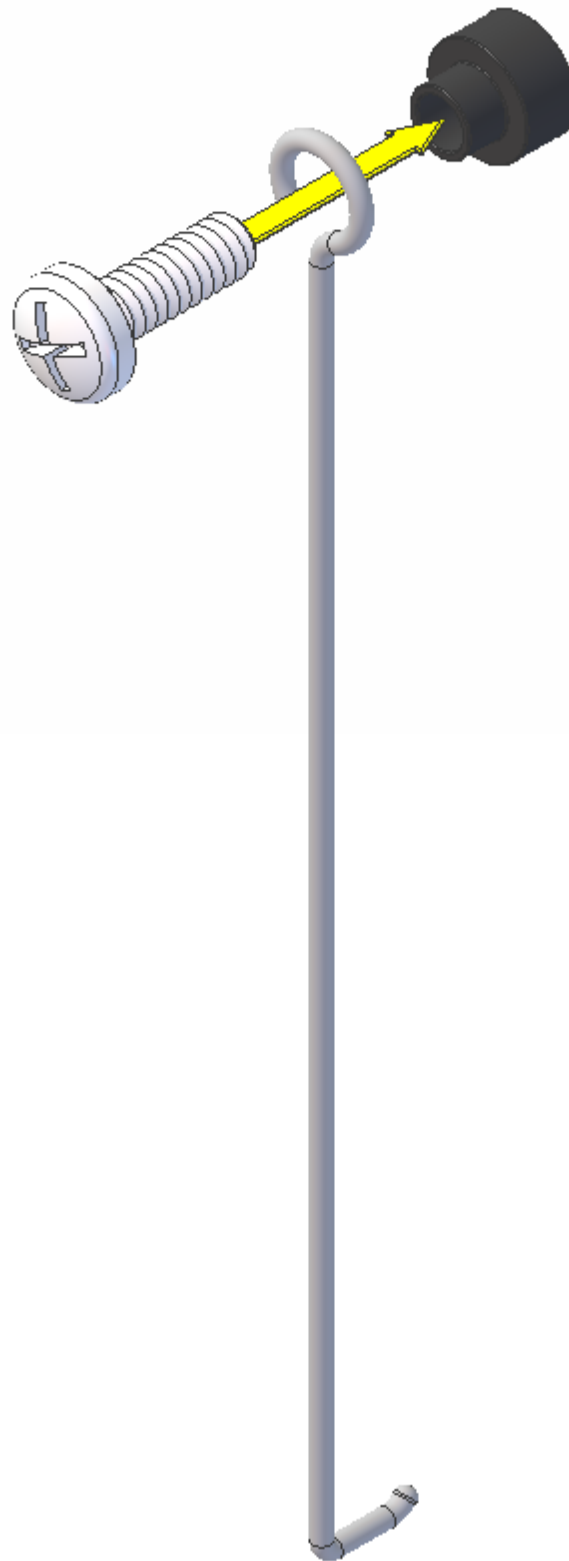
Slide the piston and conrod into the front tube.
Some air pressure should be felt as you slide it in.



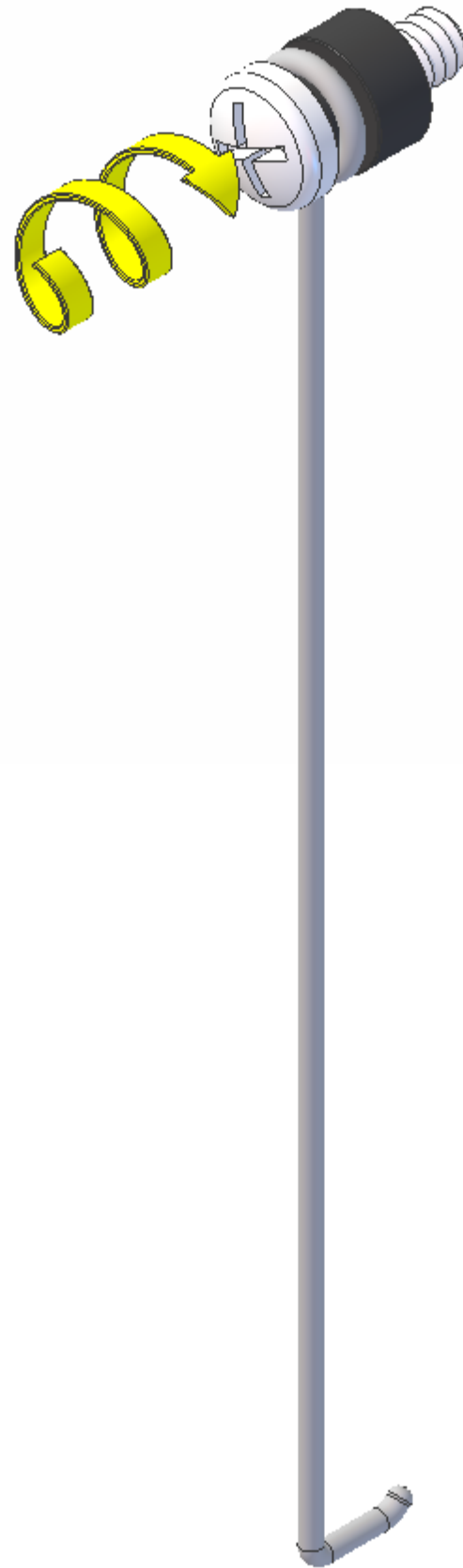
Screw the conrod screw into the hole in the front face of the flywheel. Tighten only sufficient to lock, over-tightening will cause the conrod bush to expand and pinch the conrod eye, which could prevent your engine from running.



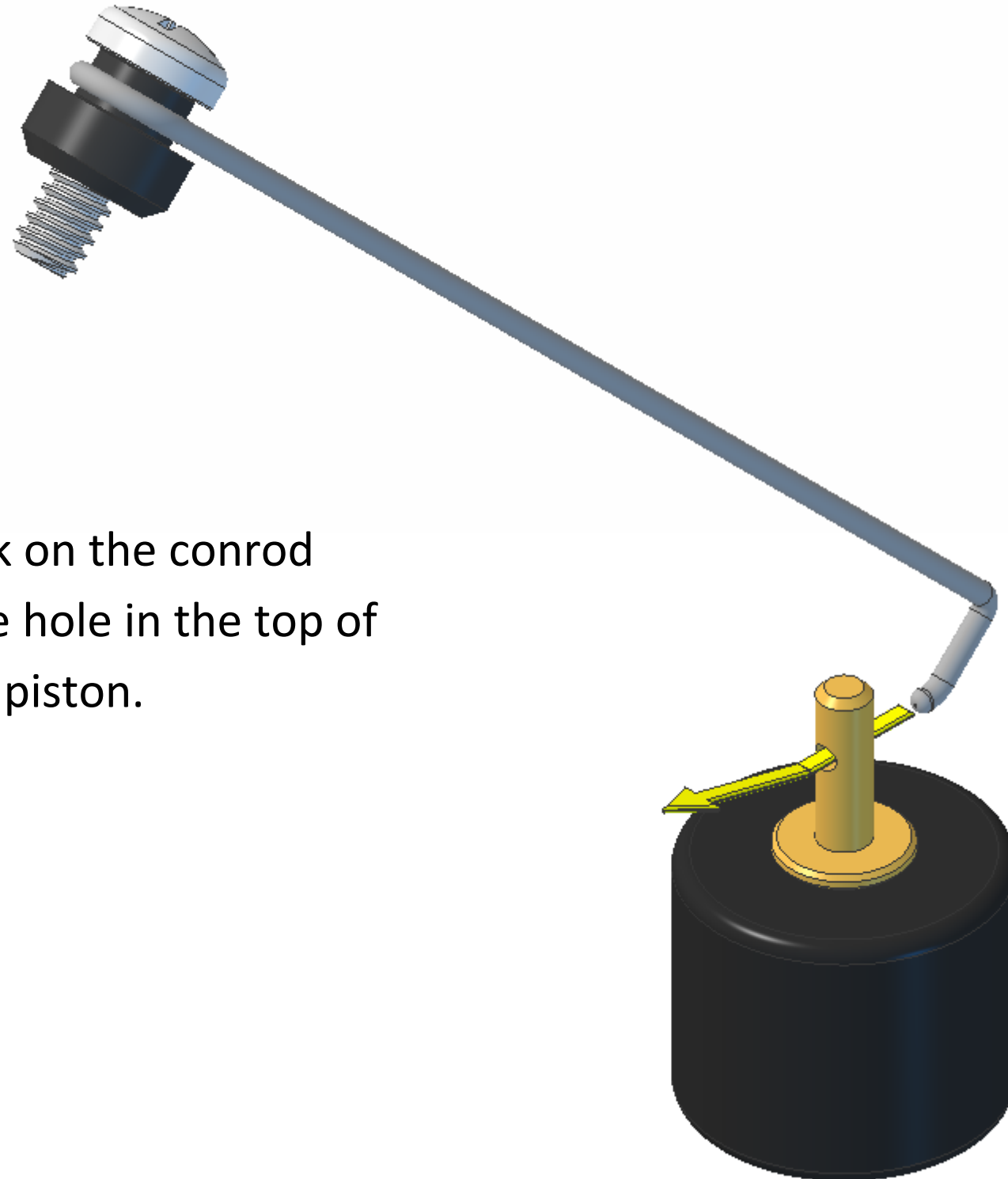
Fit one conrod onto one conrod bush and secure with one M2x6mm roundhead screw. The screw only needs screwing in a couple of turns at this stage. Note, the hook on the bottom of the conrod should be aligned as shown in the diagram.



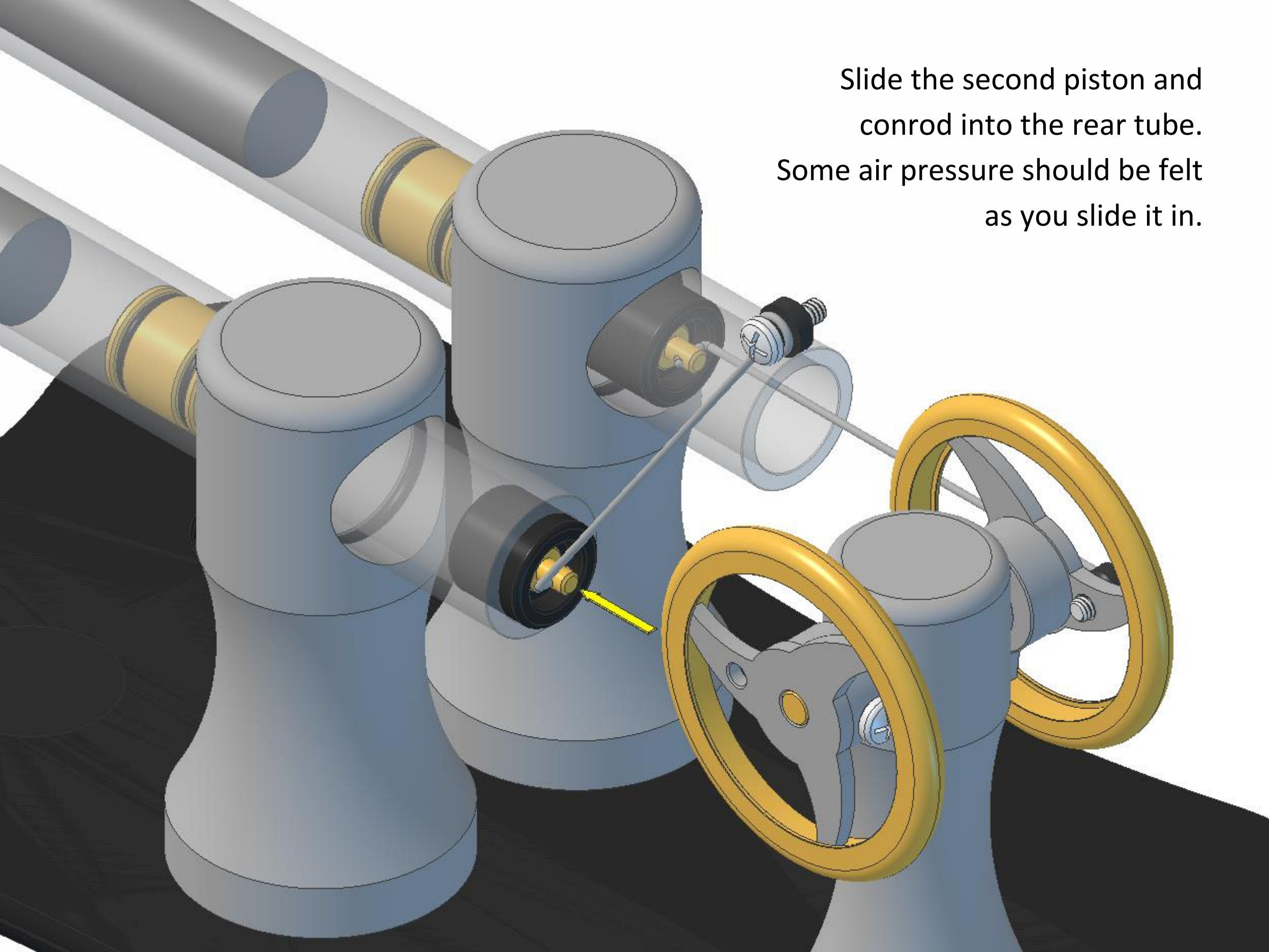
Screw the screw in until it *just* touches the bush. Do not over-tighten or you could cause the bush to expand and pinch the conrod eye, which could prevent your engine from running.

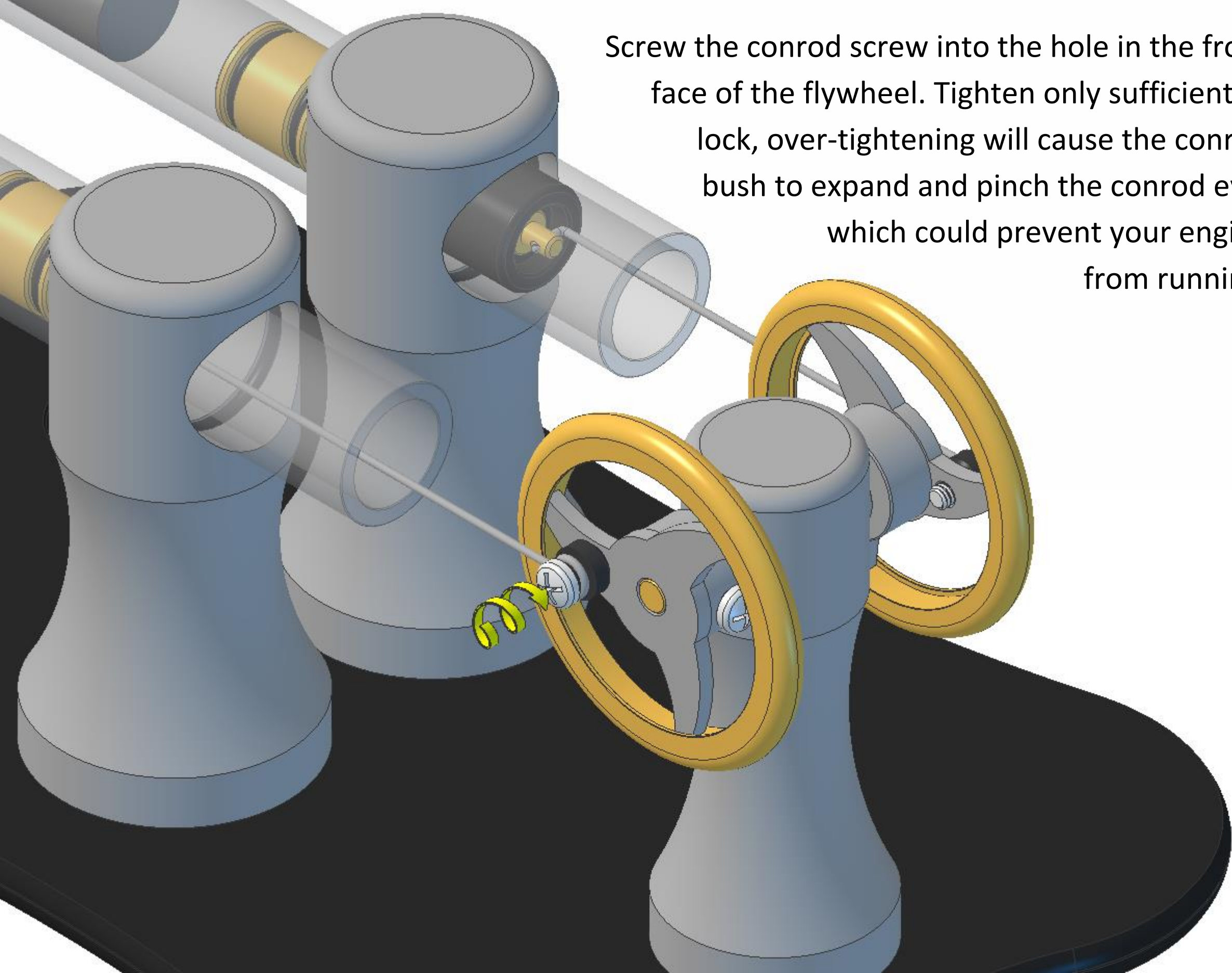


Fit the hook on the conrod through the hole in the top of the second piston.



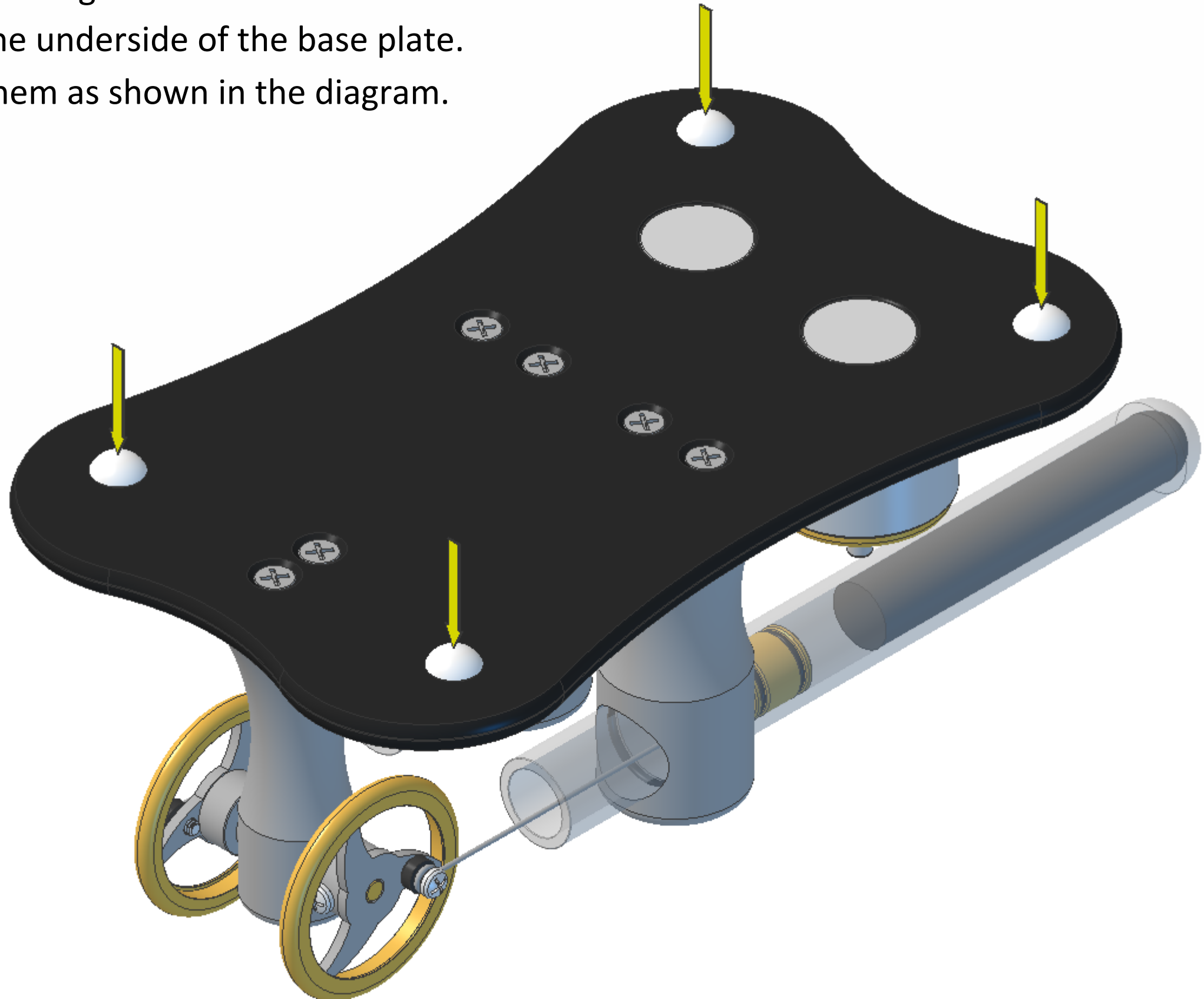
Slide the second piston and
conrod into the rear tube.
Some air pressure should be felt
as you slide it in.





Screw the conrod screw into the hole in the front face of the flywheel. Tighten only sufficient to lock, over-tightening will cause the conrod bush to expand and pinch the conrod eye, which could prevent your engine from running.

Peel the backing off the four rubber feet and stick them to the underside of the base plate. Position them as shown in the diagram.

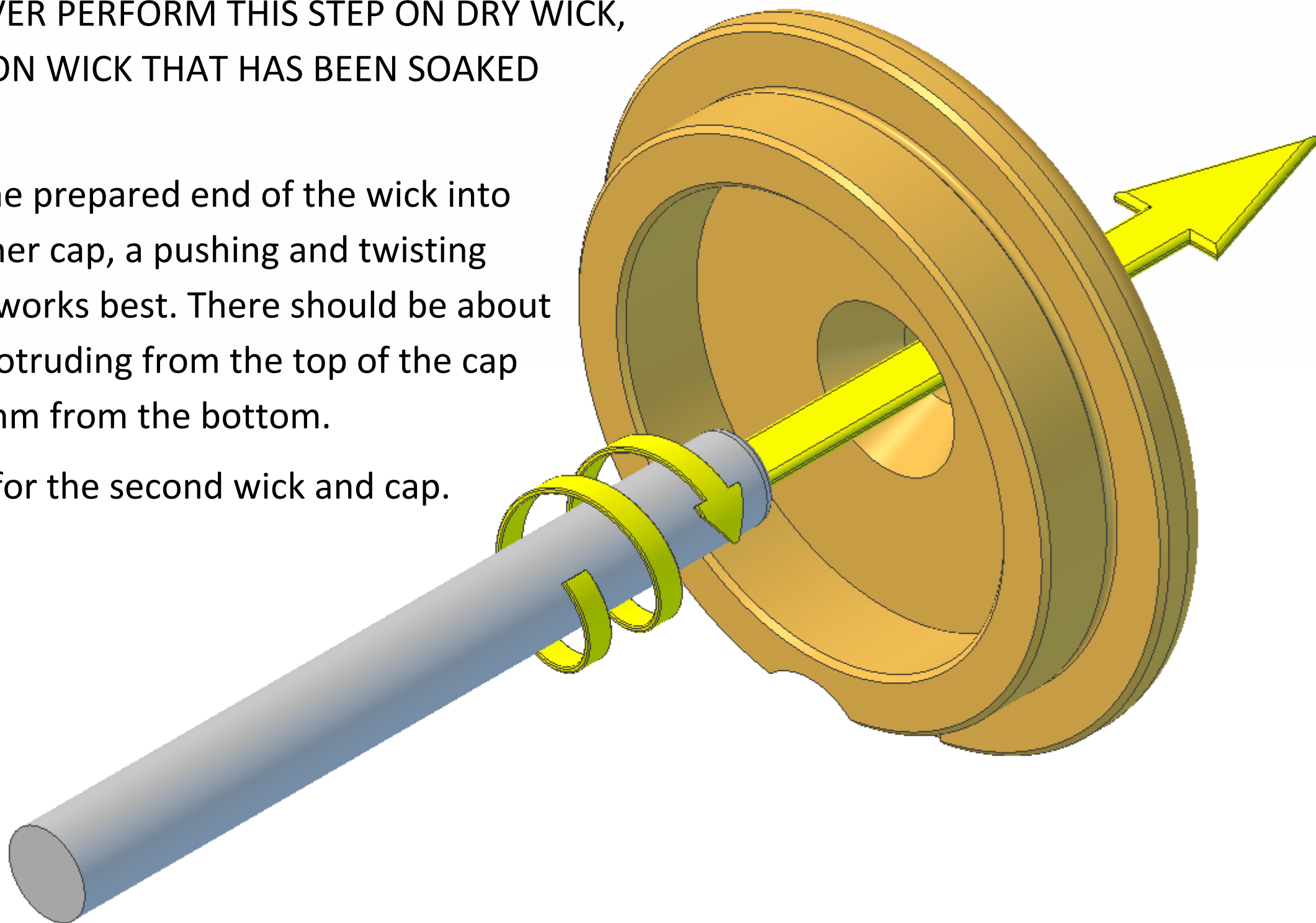


If the top end of the wick is frayed you will need to burn off the loose fibres, allow to cool, and then roll the end into a blunt point.

**ONLY EVER PERFORM THIS STEP ON DRY WICK,
NEVER ON WICK THAT HAS BEEN SOAKED
IN FUEL.**

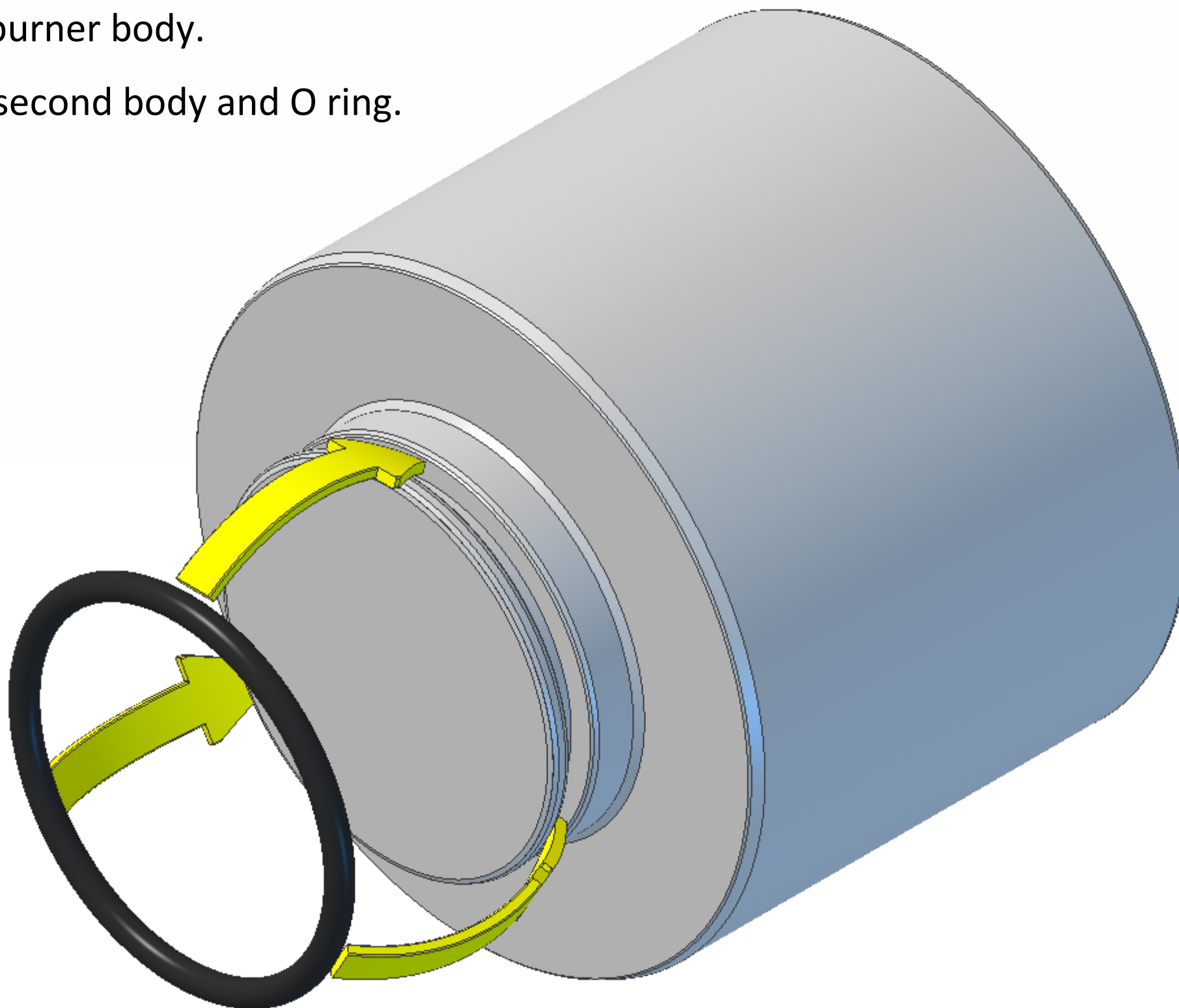
Insert the prepared end of the wick into the burner cap, a pushing and twisting motion works best. There should be about 4mm protruding from the top of the cap and 15mm from the bottom.

Repeat for the second wick and cap.



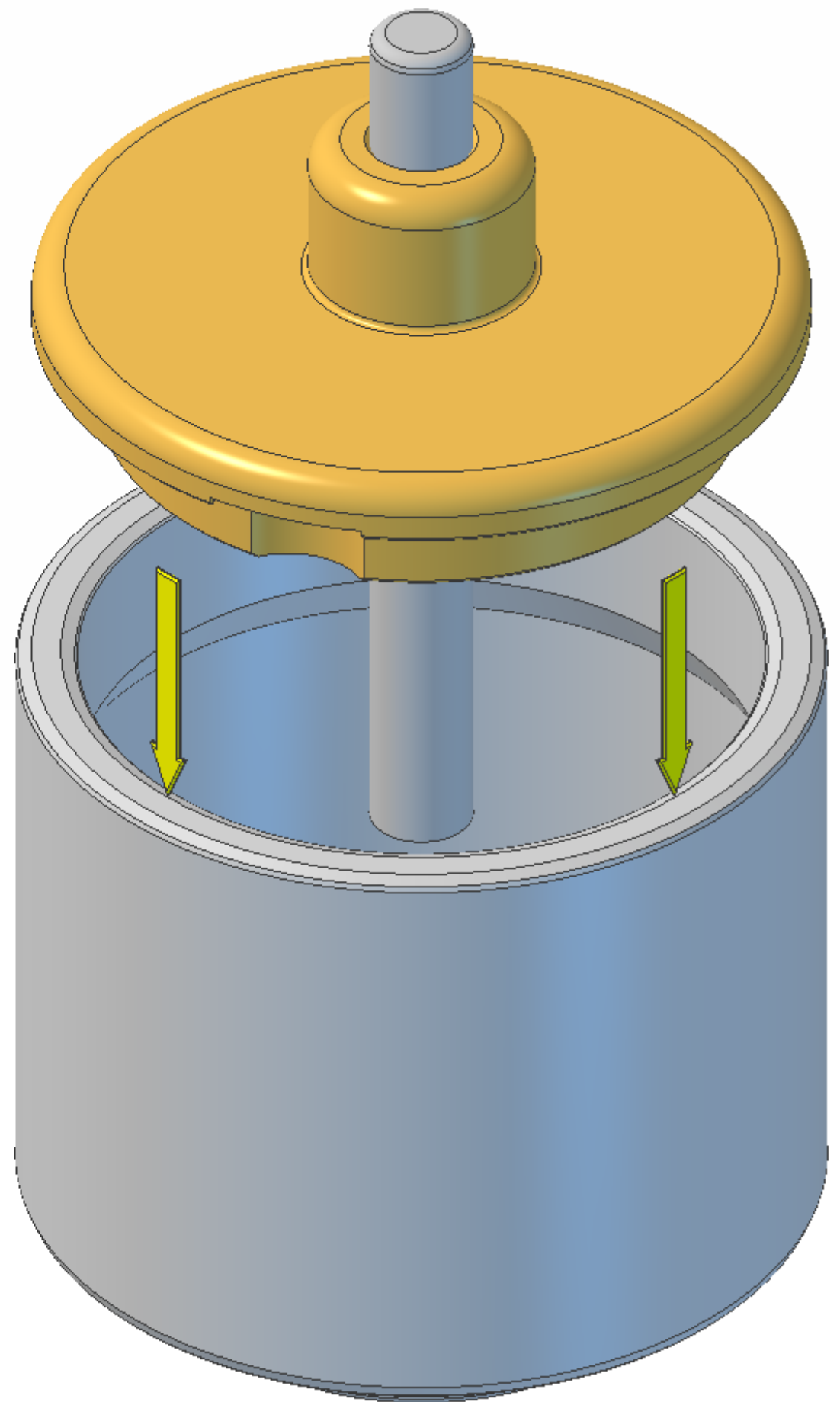
Fit one 13mm O ring into the groove on the bottom of the burner body.

Repeat for the second body and O ring.



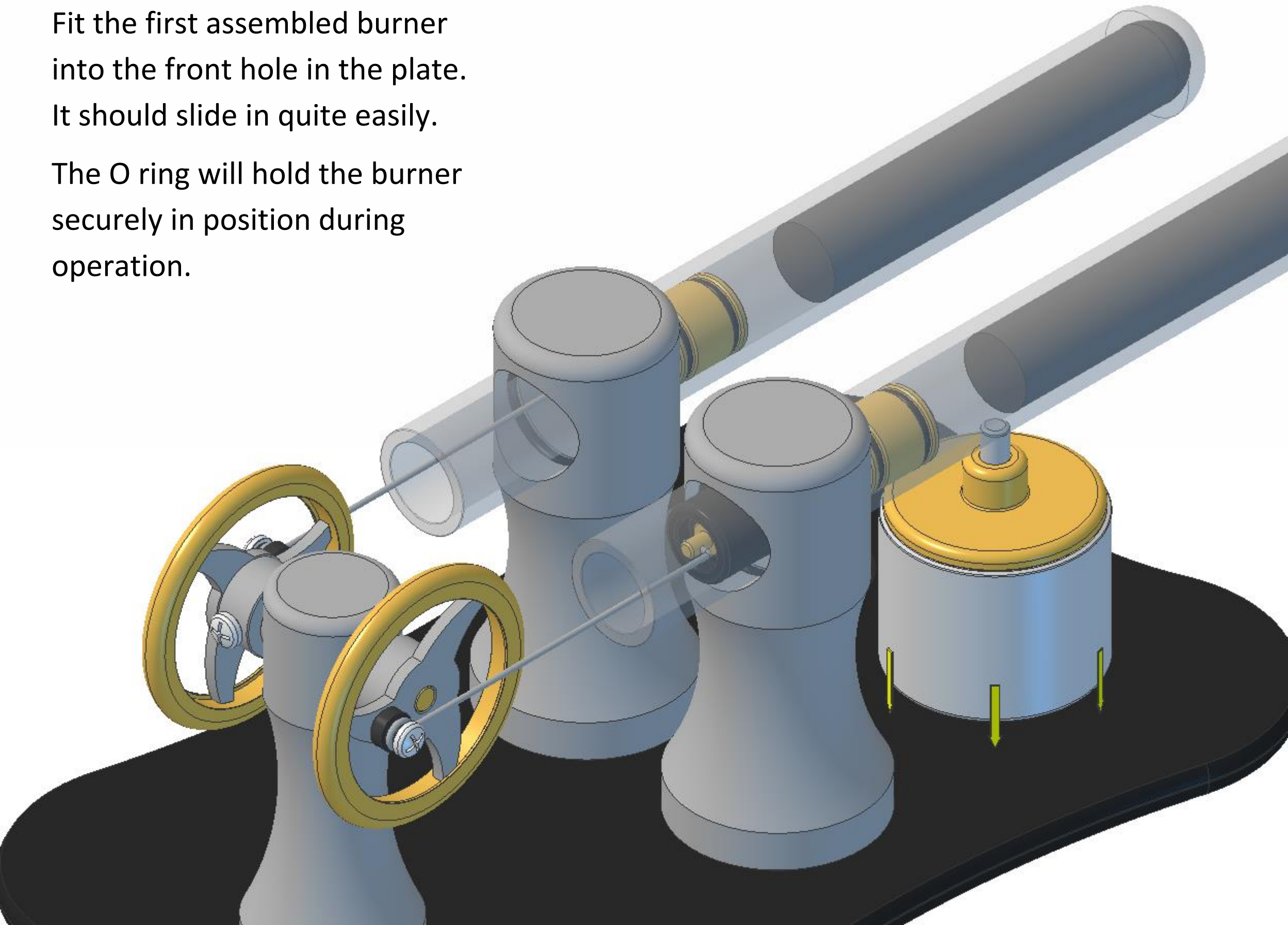
Fit the burner cap into the burner body.

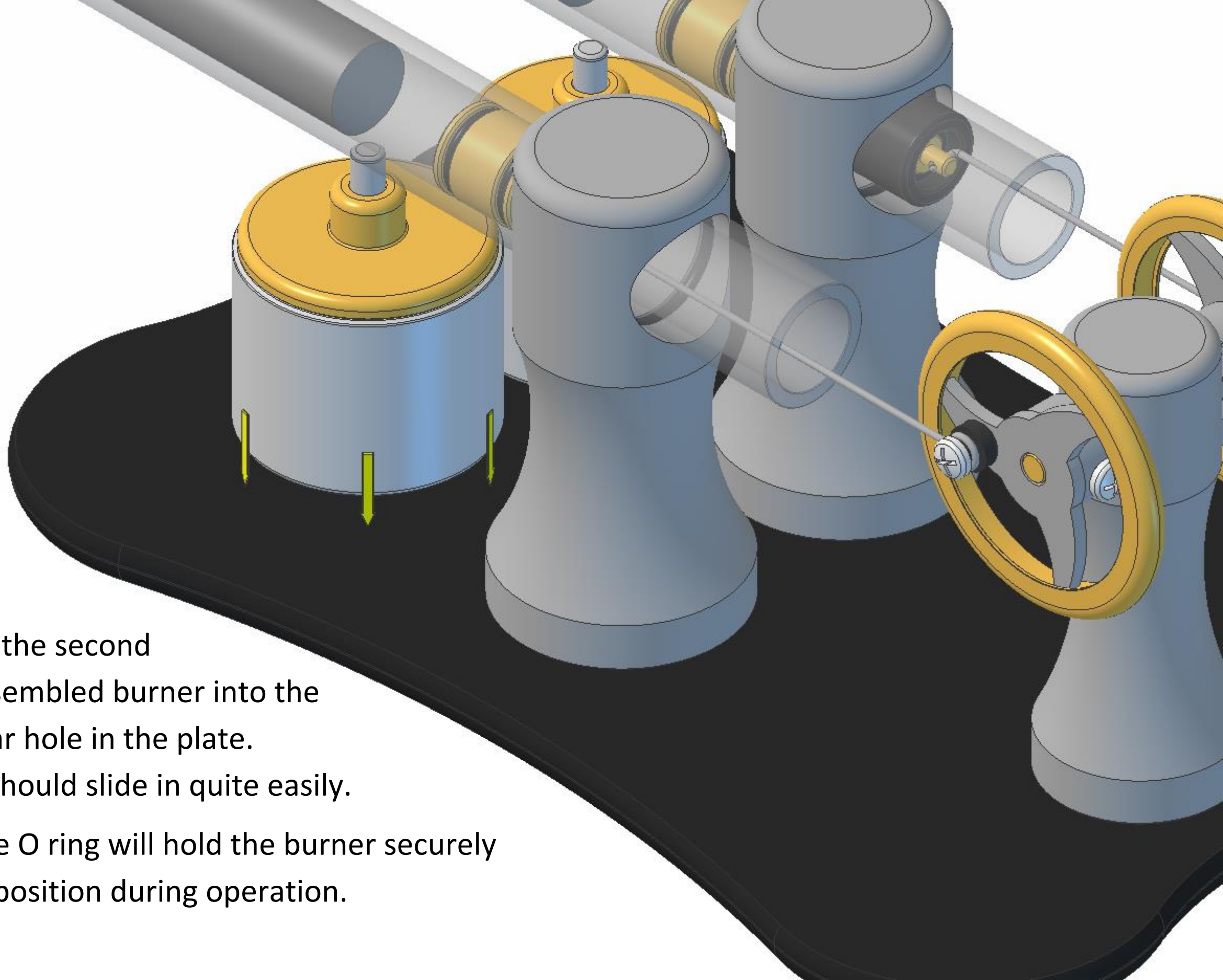
Repeat for the second cap and body.



Fit the first assembled burner into the front hole in the plate. It should slide in quite easily.

The O ring will hold the burner securely in position during operation.





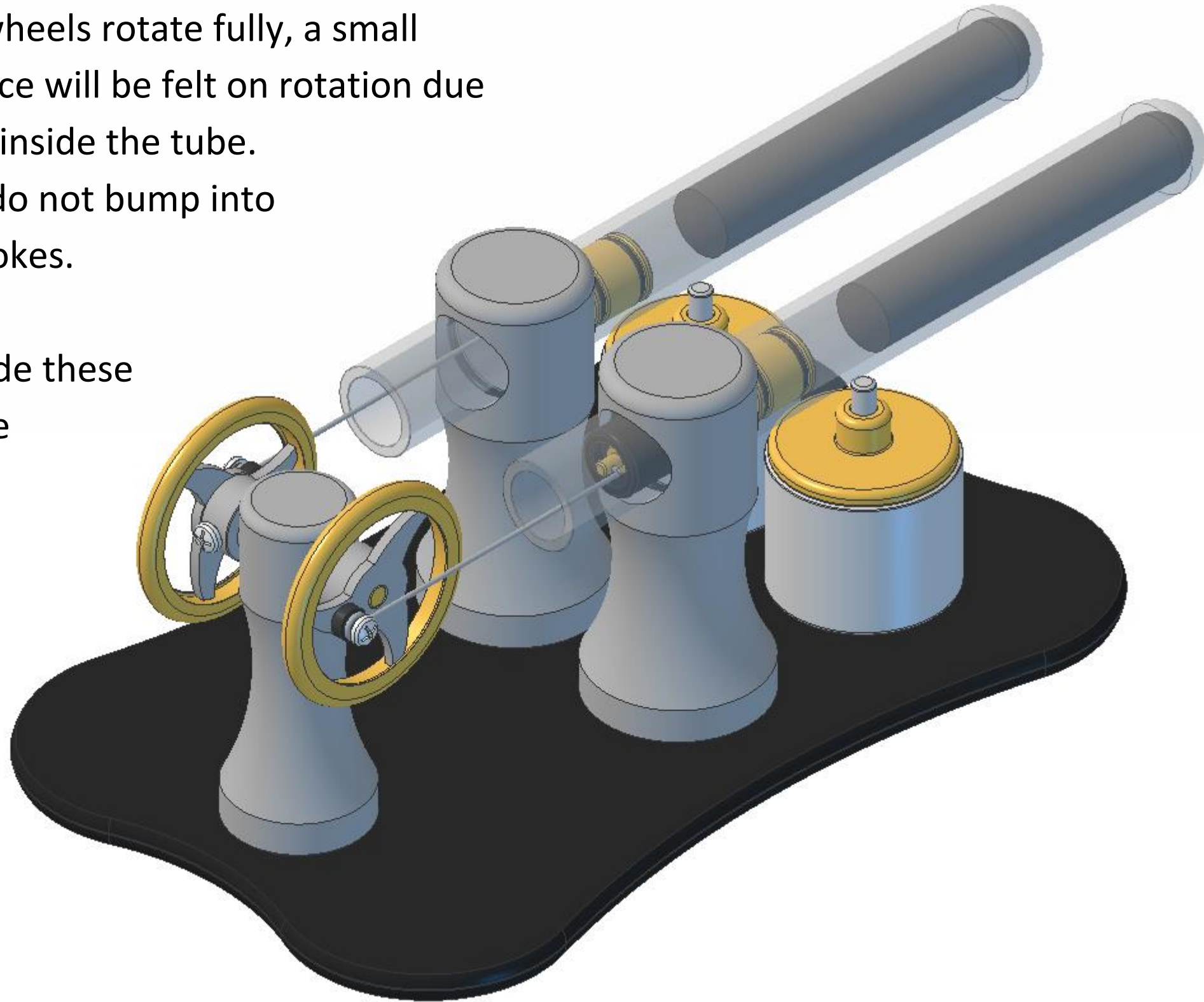
Fit the second assembled burner into the rear hole in the plate. It should slide in quite easily.

The O ring will hold the burner securely in position during operation.

Your engine is now fully assembled.

Check that the flywheels rotate fully, a small amount of resistance will be felt on rotation due to the air pressure inside the tube. Check the pistons do not bump into the front of the chokes.

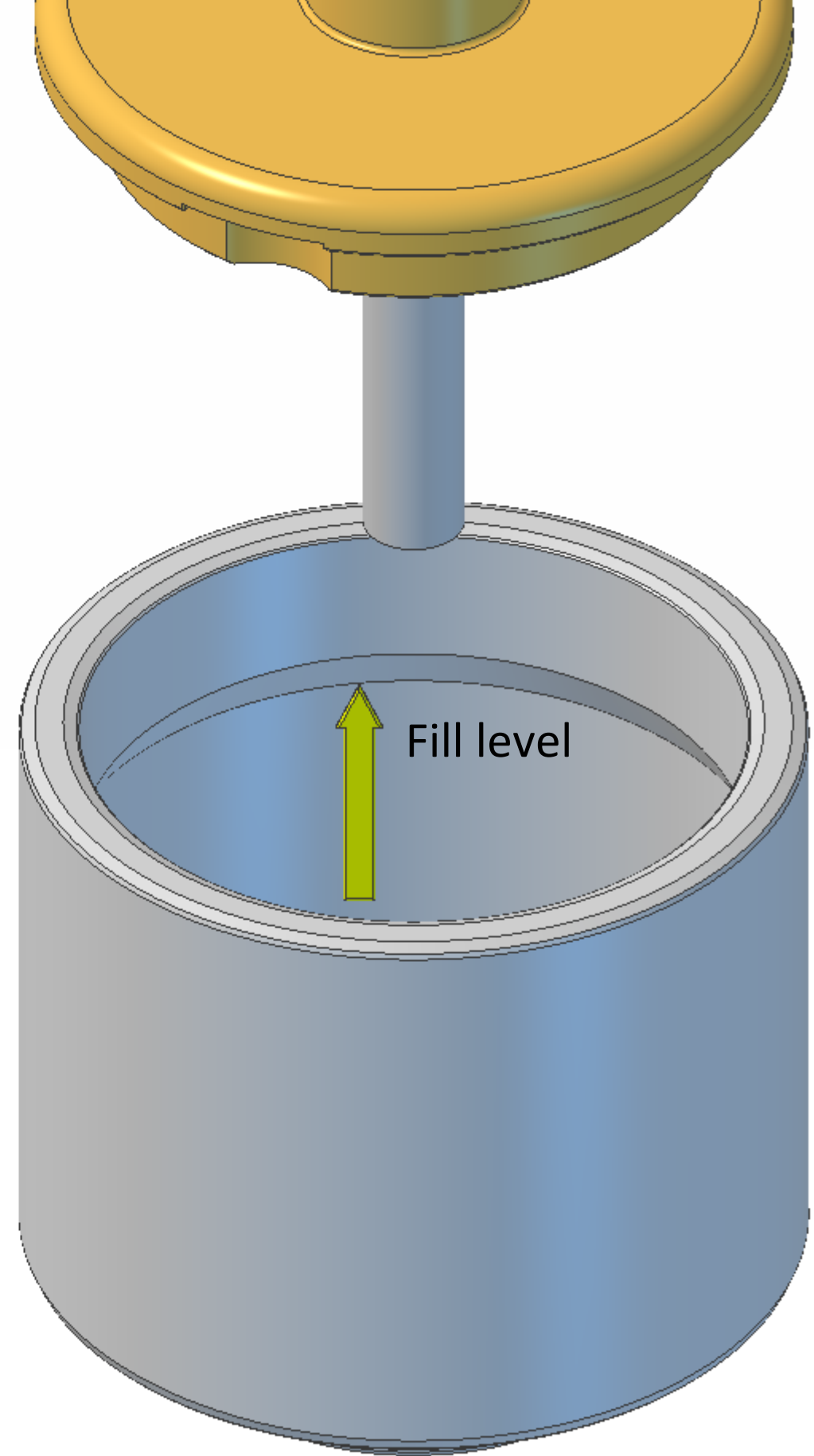
Once you have made these final checks you are ready to operate your engine.



The engine uses Methylated Spirits or Denatured Alcohol as fuel.

Remove the burners from the engine base plate and remove the caps from the bodies. There is a small step about a quarter of the way down inside, fill with fuel to this level **AND NO MORE**. Trim the wicks to 4mm protruding from the tops and 15mm from the bottoms. Fit the caps back in the bodies.

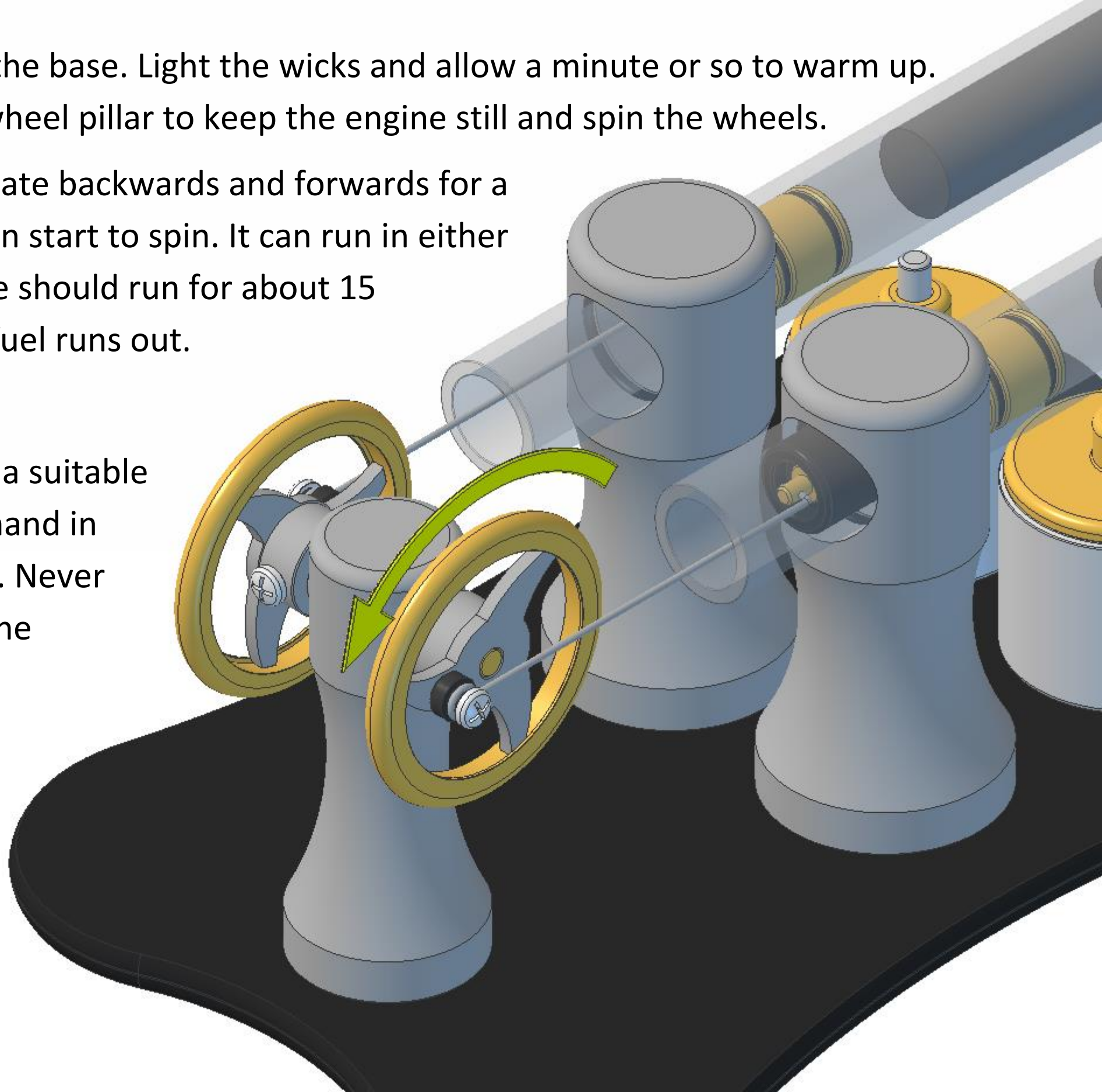
The caps have a small vent slot on their undersides. These must always be kept clear or the burner caps might pop off during operation and spill burning fuel on the base plate.



Fit the burners into the base. Light the wicks and allow a minute or so to warm up. Press down on the wheel pillar to keep the engine still and spin the wheels.

The engine will oscillate backwards and forwards for a few seconds and then start to spin. It can run in either direction. The engine should run for about 15 minutes before the fuel runs out.

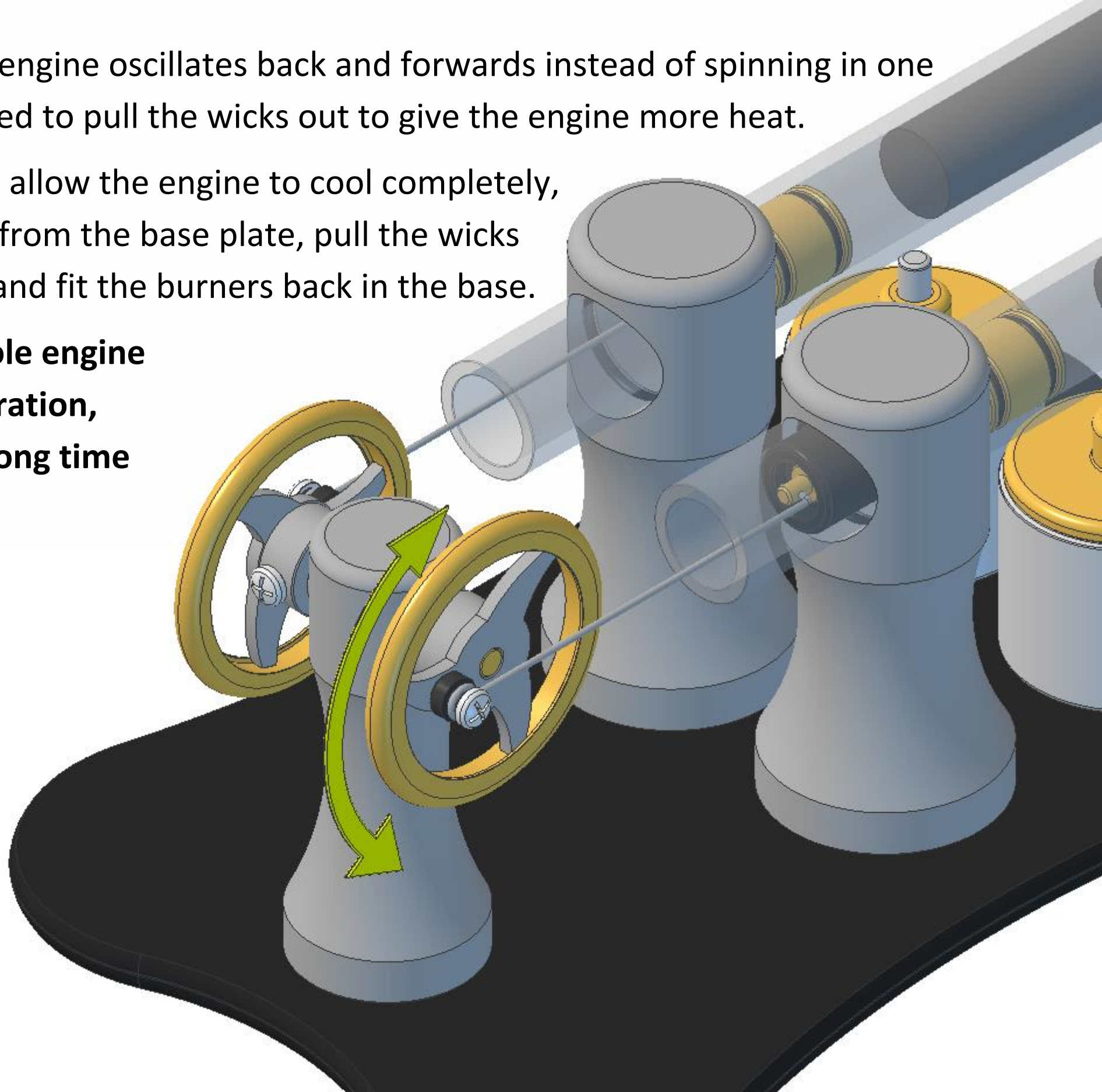
Make sure you have a suitable fire extinguisher to hand in case of emergencies. Never leave a running engine or naked flame unattended.



If you find that your engine oscillates back and forwards instead of spinning in one direction you will need to pull the wicks out to give the engine more heat.

Blow the flames out, allow the engine to cool completely, remove the burners from the base plate, pull the wicks out a fraction more and fit the burners back in the base.

Remember, the whole engine gets very hot in operation, and stays hot for a long time after the flame is extinguished.

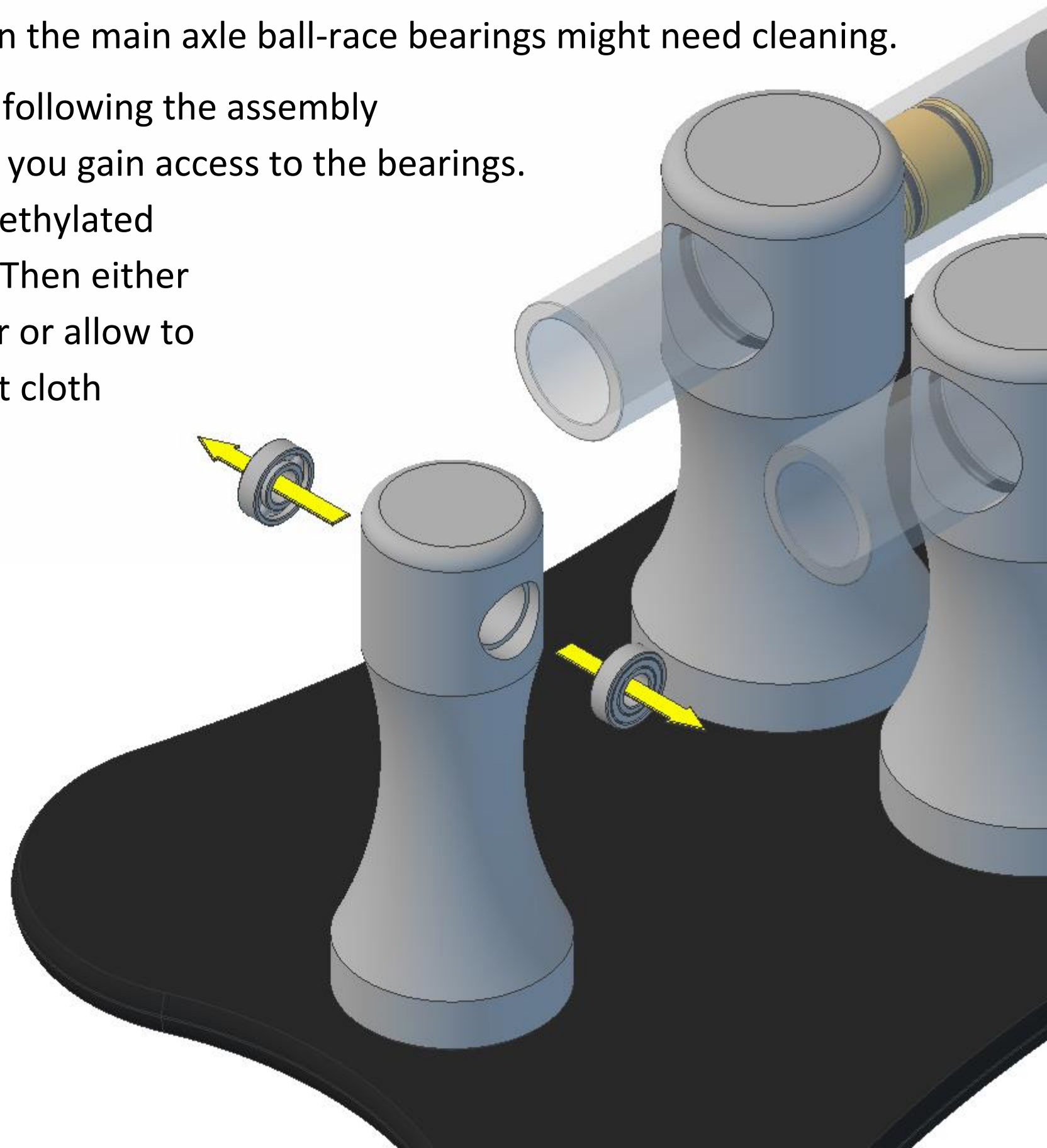


If your engine struggles to run the main axle ball-race bearings might need cleaning.

Disassemble your engine (by following the assembly instructions backwards) until you gain access to the bearings.

Remove them and rinse in Methylated spirits or Denatured alcohol. Then either blow dry with compressed air or allow to dry naturally on an absorbent cloth or paper towel.

Follow the assembly instructions to reassemble your engine.



If your engine struggles to run you might need to clean the pistons and tubes.

Unscrew the conrod screws from the flywheels and slide the conrods and pistons out of the tube.

Wipe the pistons with a paper towel and clean the insides of the tubes with a rolled up paper towel or cotton bud.

Make sure there are no stray fibres on the pistons or in the tubes and re-fit by sliding the pistons into the tubes (some air pressure will be felt, this is normal) and screwing the conrod screws into the holes in the faces of the flywheels.

