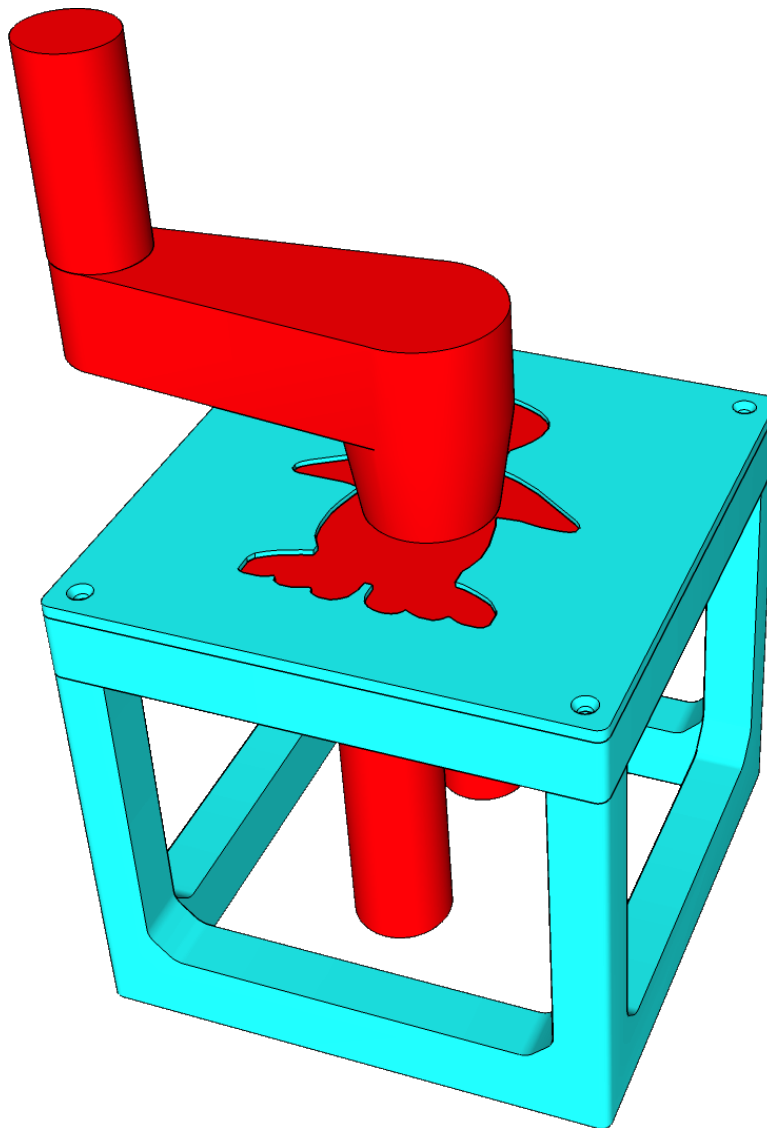


Mini Rotosquare

Assembly Guide



Guide version from 09/25/19



Required parts

In order to build the Mini Rotosquare you will need different parts and tools that are listed below. Note that we provide links for parts that you might need to buy. However, we are not endorsing any product but simply link to one that has been working for us in the past.

3d printed parts

Part name	Quantity	File name	Print settings
bottom carrier	1	Carrier_bottom.stl	20% infill, no support
top carrier	1	Carrier_top.stl	20% infill, no support
coupling	1	Coupling.stl	50% infill, no support
crank	1	Crank.stl	20% infill, no support
disc	1	Disc.stl	20% infill, no support
frame	1	Frame.stl	20% infill, no support, reduce printing speed
handle	1	Handle.stl	20% infill, no support
pencil holder	2	Holder.stl	20% infill, no support
reuleaux	1	Reuleaux.stl	20% infill, no support

Note: Tolerances are very important to build a device that turns easily. Therefore it is necessary that your 3d printer is well calibrated and able to print the .stl-files as accurately as possible. Printing the frame and carriers in a different color than the rest of the parts might give your Mini Rotosquare a cool look.

Other parts

Part name	Quantity	Link	Comments
Pencils	2		Regular pencils cut to a length of about 30mm
Spring	4	Link	0.5mm (wire) x 5.5mm (diameter) x 42mm (length)
Threaded insert	6	Link	M2 x 3mm (length) x 3.2mm (outer diameter)
Torx screw*	6	Link	M2 x 20mm (length), countersunk

*Note: you can use any type of screw as long as it is countersunk, M2, and 20mm long. Also note that the screws to attach the crank to the top carrier can be shorter than 20mm.

Required tools

- 3d printer (and tools required to remove parts from print bed)
- Soldering iron (and if desired also special tips to set the threaded inserts, although these are not absolutely necessary)
- Torx screwdriver (or any other screwdriver that fits your selected screw)
- Super glue ([Link](#))
- File
- Dust mask
- Putty knife
- Side cutting pliers
- Tweezers (these are optional to handle the threaded inserts)



Assembly

Threaded inserts

The Mini Rotosquare is designed in a way so that it can easily be assembled and disassembled. For that purpose, you need to set threaded inserts into the crank and the frame. You will need a soldering iron to perform this task. There are special tips you can use to facilitate setting of the inserts. In the following, however, we do not use such tips. Let us start with the crank to set the threaded inserts.

- (1) Put the crank flat on a desk and put a threaded insert on top of one of the holes in the crank:



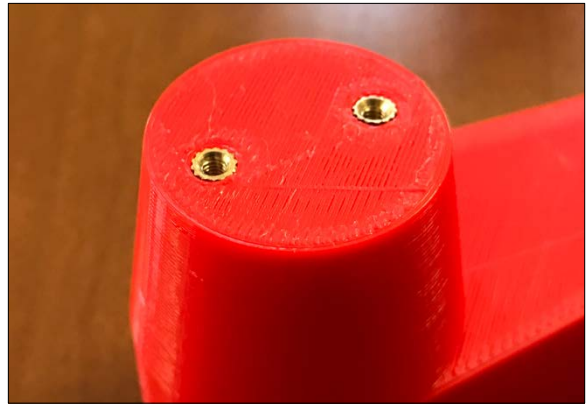
- (2) Heat up the soldering iron. 350 degrees Fahrenheit is a good temperature in case your soldering iron allows to adjust temperature. Press the tip of the soldering iron into the threaded insert. Gently push the threaded insert into the plastic until its top surface is level with the top surface of the crank. Try to avoid that the soldering iron touches the plastic directly:



- (3) Carefully put the soldering iron away. You do not need to rush doing that. Then take the putty knife and put it on top of the threaded insert to make sure it sits flat with the surface of the crank:



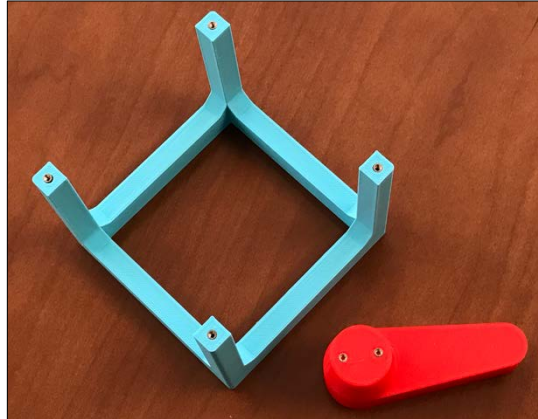
- (4) Repeat this process with the other hole in the crank:



- (5) Now repeat this process with the frame:



- (6) Sink a threaded insert into all 4 holes of the frame and make sure they sit flat with the top of the frame:



Crank handle

In order to make sure that the crank handle is not falling out during use, we are going to glue it in. For that purpose, put a bit of super glue on the threads in the crank:



Next, screw the handle gently in and make sure not to overtighten it. After a few minutes, the glue should be strong enough so that you can continue working with the crank and its handle.



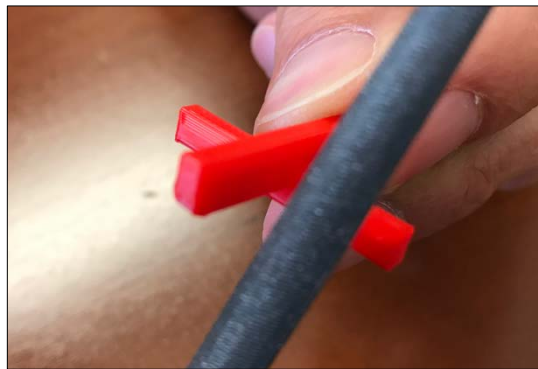
Clean 3d printed models

In order for the Mini Rotosquare to turn easily, it is necessary that the disc and the reuleaux pieces are flat and smooth. This is also particularly important for the sides of these pieces. Depending on the quality of your print, you will need to file down any “bumps” on your prints. Do not underestimate this step. It is crucial for a smooth and easy operation of your Mini Rotosquare. This is especially the case if your printer put a little “seam” at the border, as shown here:



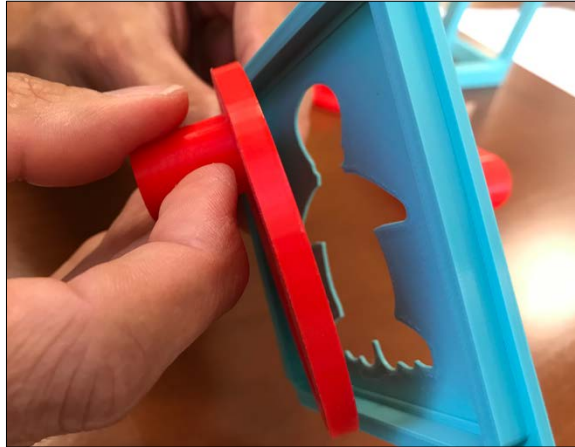
It is best to do this dusty work outside. Do not forget to wear a good quality dust mask. Take the file and gently flatten any bumps that you can see on the disc and the reuleaux. Try to make them as smooth as possible.

It is also important that the coupling is very smooth. So, make sure that all faces are smooth without any bumps. Try the coupling in the grooves of the disc and the reuleaux to make sure that it runs easily in them:

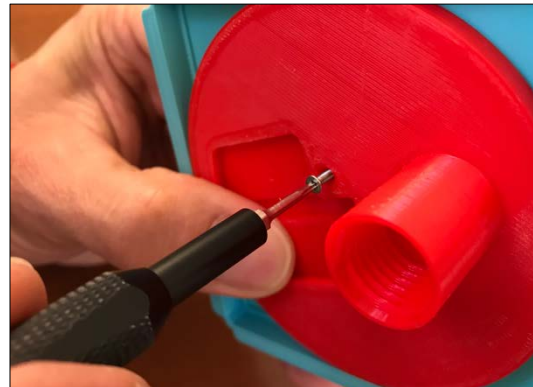


Assembly of the Rotosquare

- (1) Put the disc into the top carrier:



- (2) Use screws to put the crank onto the disc:



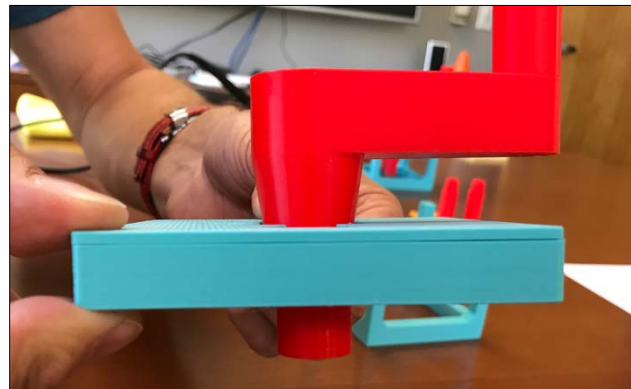
- (3) Holding the top carrier upside down (so that the crank and handle are on the bottom), put the coupling into the groove of the disc:



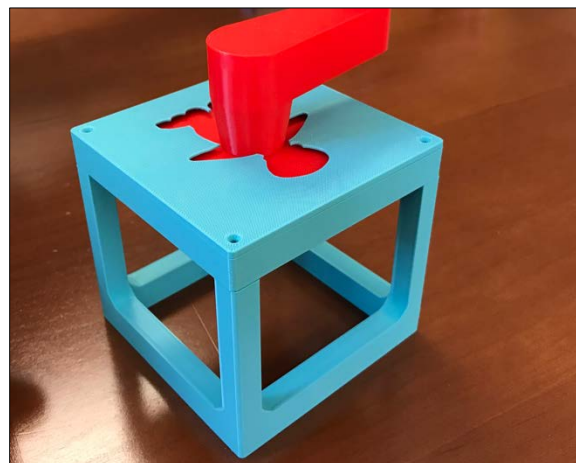
- (4) Put the reuleaux on the disc so that the coupling falls into the groove of the reuleaux. The disc and the reuleaux should then sit flush on top of each other:



- (5) Put the bottom carrier around the reuleaux and make sure it goes into the top carrier. This puts the disc and the reuleaux between the top and the bottom carrier:



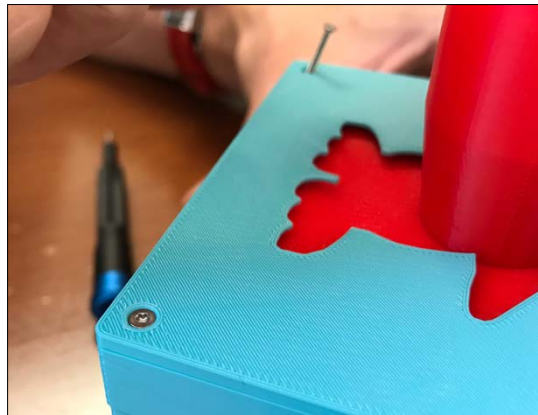
- (6) Holding the two carriers together, put them on the frame:



(7) Use the screws to screw the carriers onto the frame:



(8) Put in all four screws. Tight them gently:



Pencils

(1) Take a pencil, sharpen its tip, and cut it to approximately 30mm using side cutting pliers:



(2) Sharpen the longer left-over pencil, and again cut-off a 30mm piece from it.



(3) Take one of the pencil holders, put a 30mm pencil in it, and then add the spring on top of the pencil:



(4) Screw the pencil holder containing the pencil and the spring into the thread located on the disc. Note that it is possible that the threads are a bit tight. If this is the case, only partially screw in the holder and then unscrew it and repeat this process until you are able to fully insert the holder without excessive force:

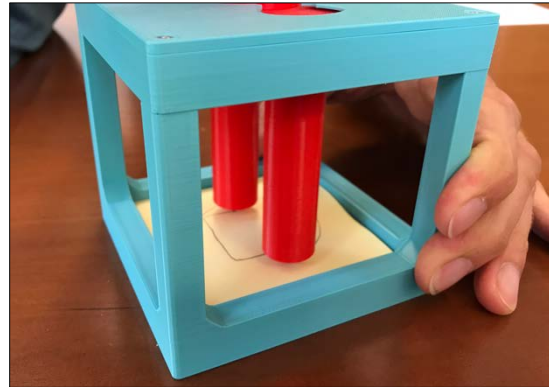
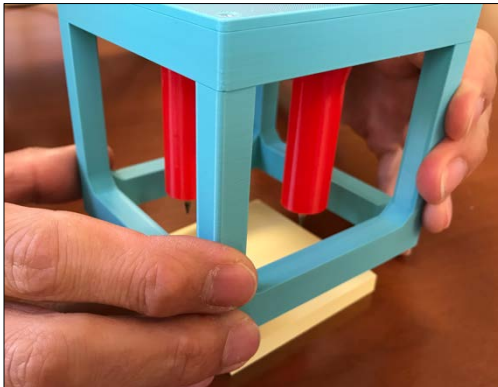


- (5) Repeat steps 3-4 above and screw in the second pencil holder containing the pencil and the spring into the reuleaux:

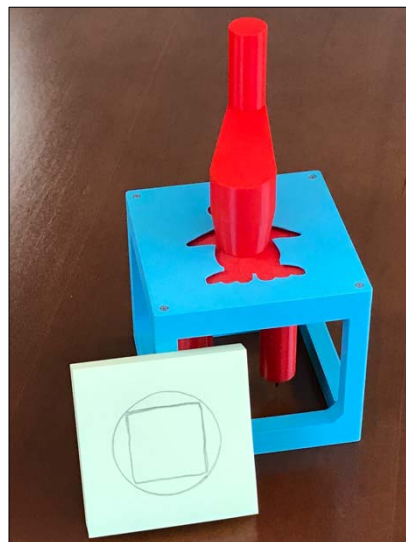


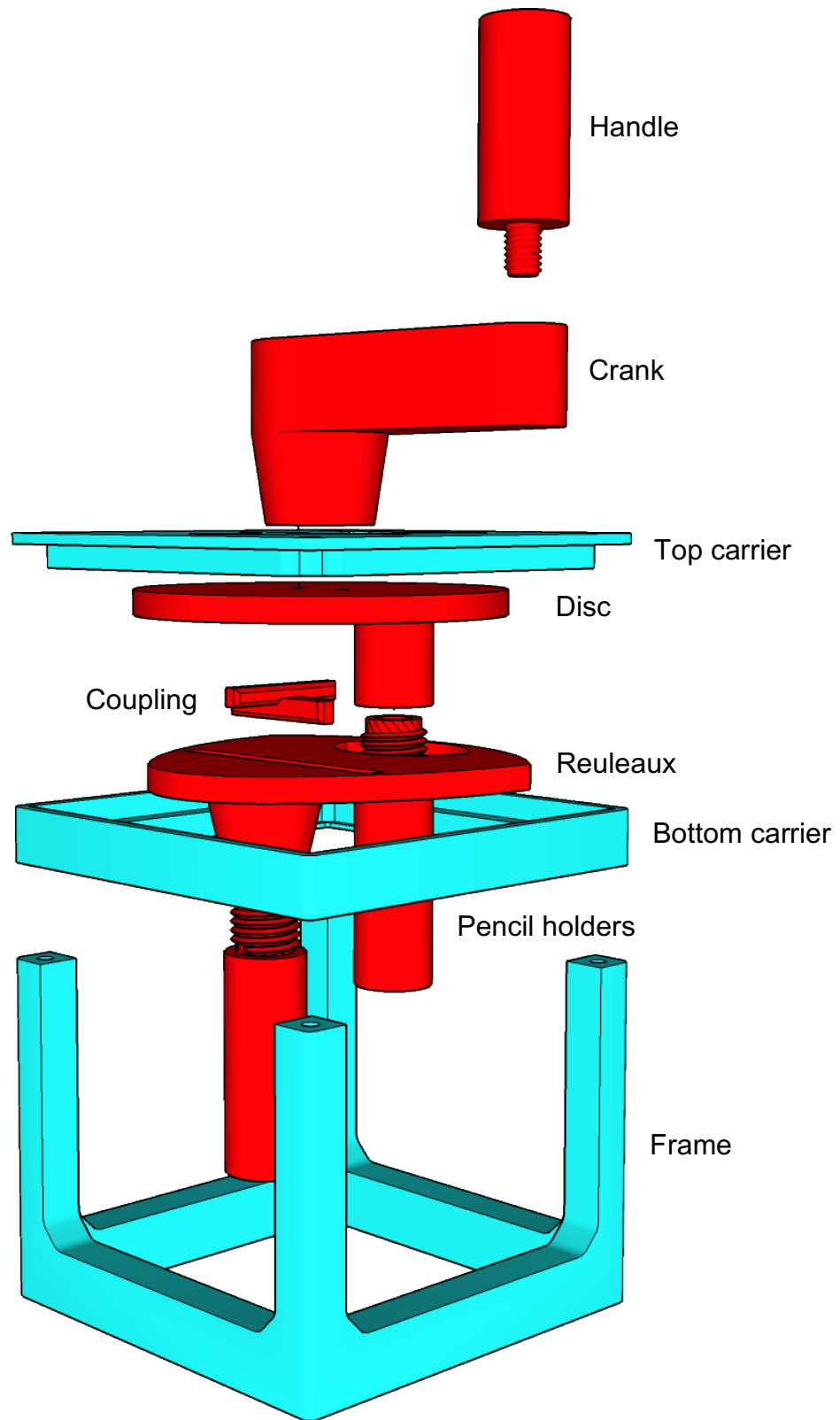
Try the device

Put the Mini Rotosquare over a stack of post-its and turn the crank:



You should now see a square within a circle on the post-it.





Parts and assembly of the Mini Rotosquare.

