My Balsa & Glass Workshop

3D Printed Steam Machine Puzzle Box

21 October 2025

Having finished the Steam ***Turbine*** Puzzle Box for my oldest son Kent, I decided to make the Steam ***Machine*** Puzzle Box as a Christmas gift for my youngest son Ryan. This puzzle box is a follow-on design from the Steam Turbine Puzzle, and again it is very interesting, nicely designed, great looking, and very complex to solve. Designed by Ralph Hanson of **flarPuzzles,** all the required STL files and a detailed instruction manual are for sale on Etsy (https://www.etsy.com/shop/flarPuzzles).

The Steam Machine Puzzle Box measures around 210x150x125mm and contains an enclosed prize compartment. This puzzle box consists of a total of **72** 3D printed parts. In addition to the 3D printed parts some other hardware (button head screws, magnets, and springs) will be needed, and they are all listed in the instruction manual. 3D printing all the parts will require approximately 1.2 kg total of filament, ***and lots of time!***

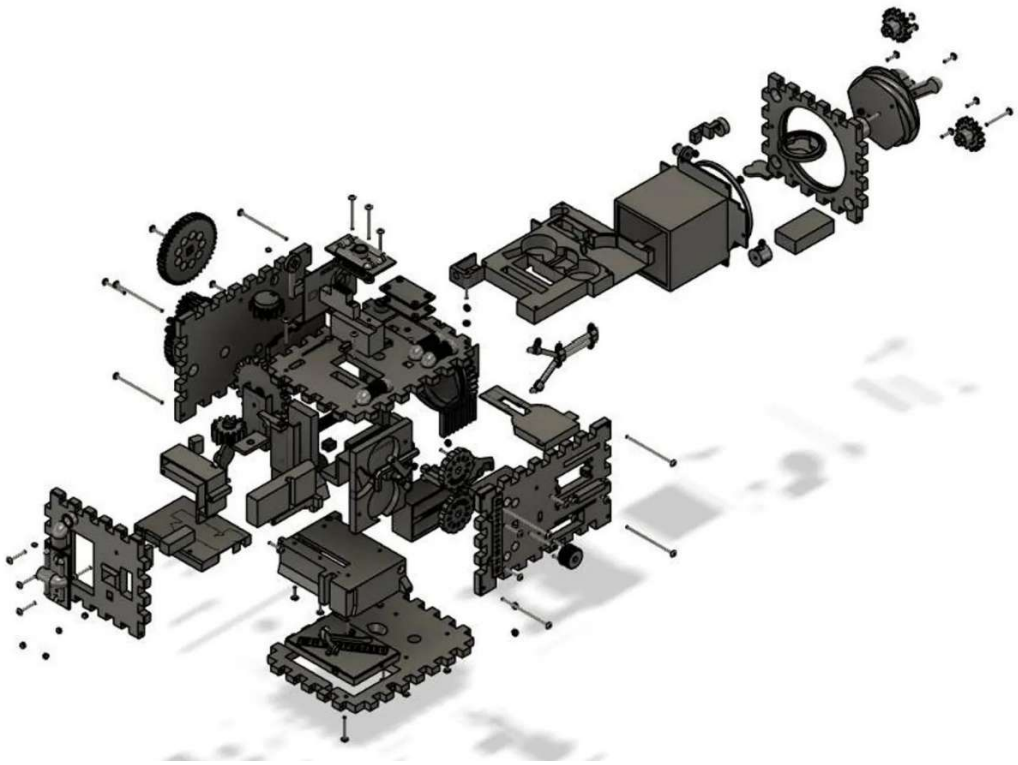


Figure 1 – Exploded View of the Steam Machine Puzzle Box

Image Source: https://www.etsy.com/shop/flarPuzzles

Figure 2 – Some Nice Examples of the Steam Machine Puzzle Box

Images Source: https://www.etsy.com/shop/flarPuzzles

Also available are the following videos:

Assembly video on YouTube: https://www.youtube.com/watch?v=TeacCcr3cA0

Solving the puzzle video on YouTube: https://www.youtube.com/watch?v=NY3lGL2zvrI, which is incorrect towards the end where he unlocks the credit card using a wrong jury rigged method, and jumps over several puzzle steps the designer intended to be used.

I also have put a "Correct" detailed puzzle box solution guide at the end of this build description.

3D Printing the Steam Machine Puzzle Box

Once I had purchased the STL files and instruction manual, the first thing I did was to establish which parts would be printed with the various types/colors of filaments I planned to use. After looking through the many fine examples of the Steam Machine Puzzle Box posted on the web, I decided to use five filaments for this project. For the Credit Card, S1 Coin, S1 Drawer Lock, S1 Key 2, S3 Drawer Gear Lock Button, the two S5 Disks, S5 Knob, and S6 Lid I will print using GIANTARM Gold Silk PLA Filament. For the S4 Chamber Heat Sink, S4 Chamber Lid Pipes, and S5 Pipes I will print using GIANTARM Copper Silk PLA Filament. This filament will also be used to print the steam pipes on Side 1, Side 3, S1 Drawer Lid and S3 Drawer Front which I will discuss more about later. For the Wrench, S1 Key, S2 Gear Big, S2 Gear Big 2, S4 Big Gear, the three S4 Small Gears, and two S6 Allen Keys I will print using GIANTARM Silver

Silk PLA Filament. For all the puzzle box sides I plan to use ELEGOO Glitter Twinkling Dark Gray PLA Filament. For all internal boxes/drawers and other internal mechanical parts I will use Creality Black Hyper-PLA until that spool is empty and then use a new spool of eSUN Black PLA+ Filament.

Following the instruction manual printing instructions sheet, I setup the two profiles I would need in Creality Print 6.3 for the 0.1mm & 0.2mm layer heights, number of top and bottom layers, and Infill percentages required for the various puzzle box parts. I then set off to print all the GIANTARM Gold Silk PLA Filament parts. Figure 3 below shows the results of my efforts. Using a **0.1mm** print layer height with the Gold Silk PLA resulted in some nice parts. The total print time for the nine Gold Silk PLA parts was **7h 28m**.

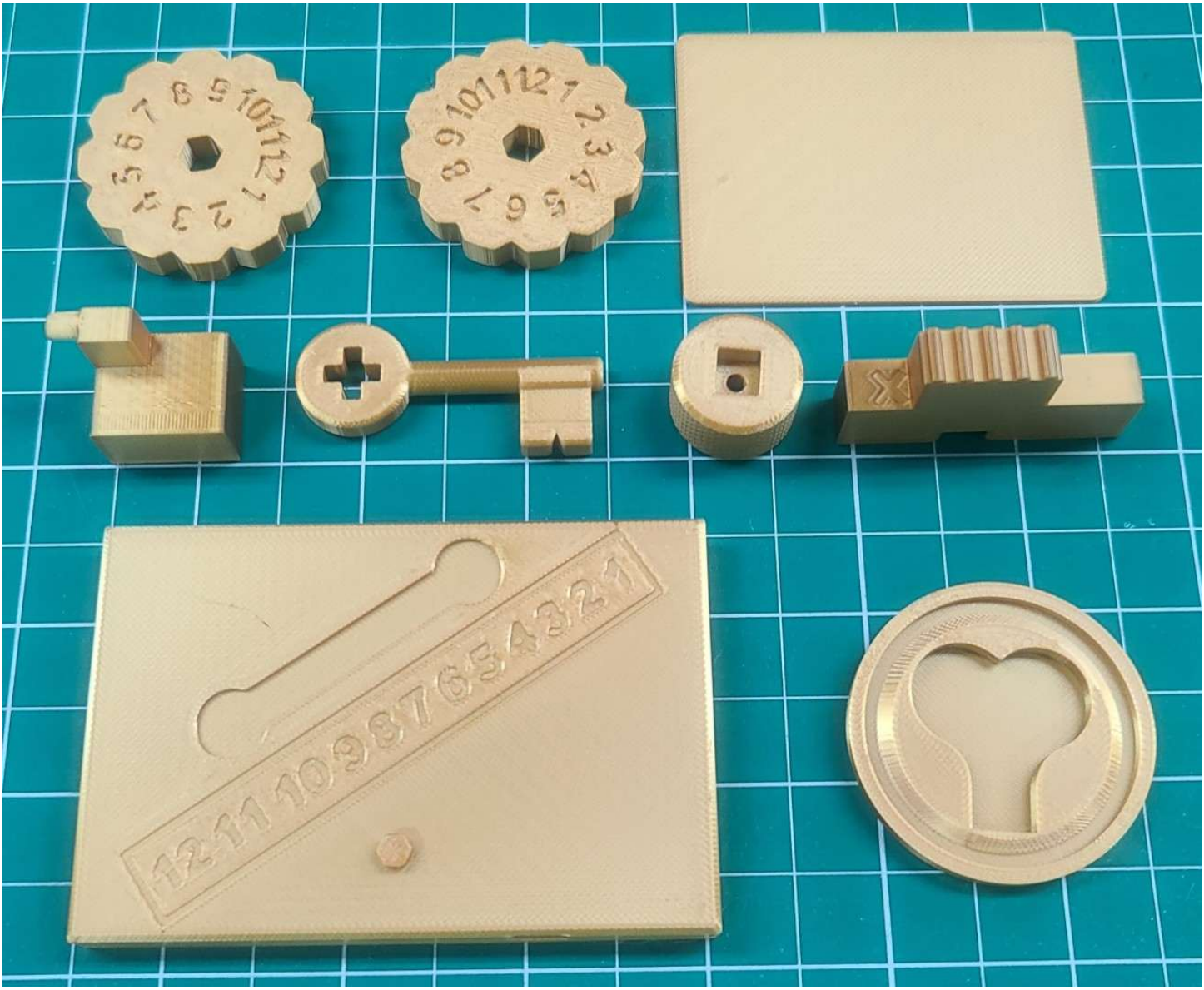


Figure 3 – Steam Machine Puzzle Box Gold Silk PLA Parts

With the Gold Silk PLA parts printed, I next moved on to print all the Silver Silk PLA parts as listed on page 2. The total print time for the ten Silver Silk PLA parts was **12h 3m.** This is due not only to a print layer height of 0.1mm, but also the lower print speed (I used 50 mm/s) required when using Silk PLA filaments. (Slow down the printing speed to as low as 20 mm/s if you want the best surface finish.). Figure 4 below shows the results of this effort.

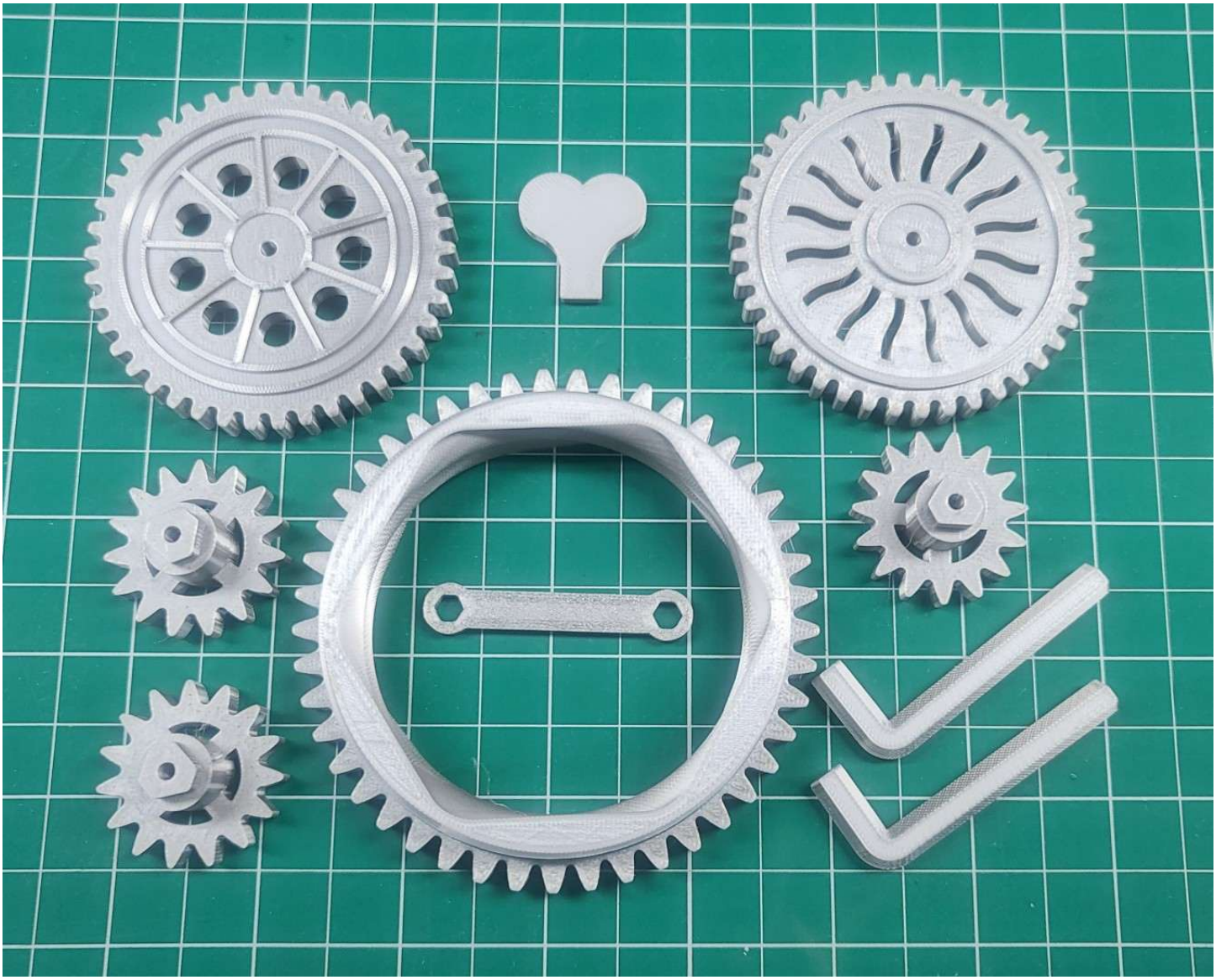


Figure 4 – Steam Machine Puzzle Box Silver Silk PLA Parts

Next I decided to print using Copper Silk PLA filament for the parts I listed on page 2. These were primarily all the various steam pipes and heat sink that mount to the outside of the puzzle box sides. Here again the small print layer height and Silk PLA slow print speed made for some slow going, but very nice parts. The total print time for the three Copper Silk PLA parts shown in Figure 5 was 3hr 2m.

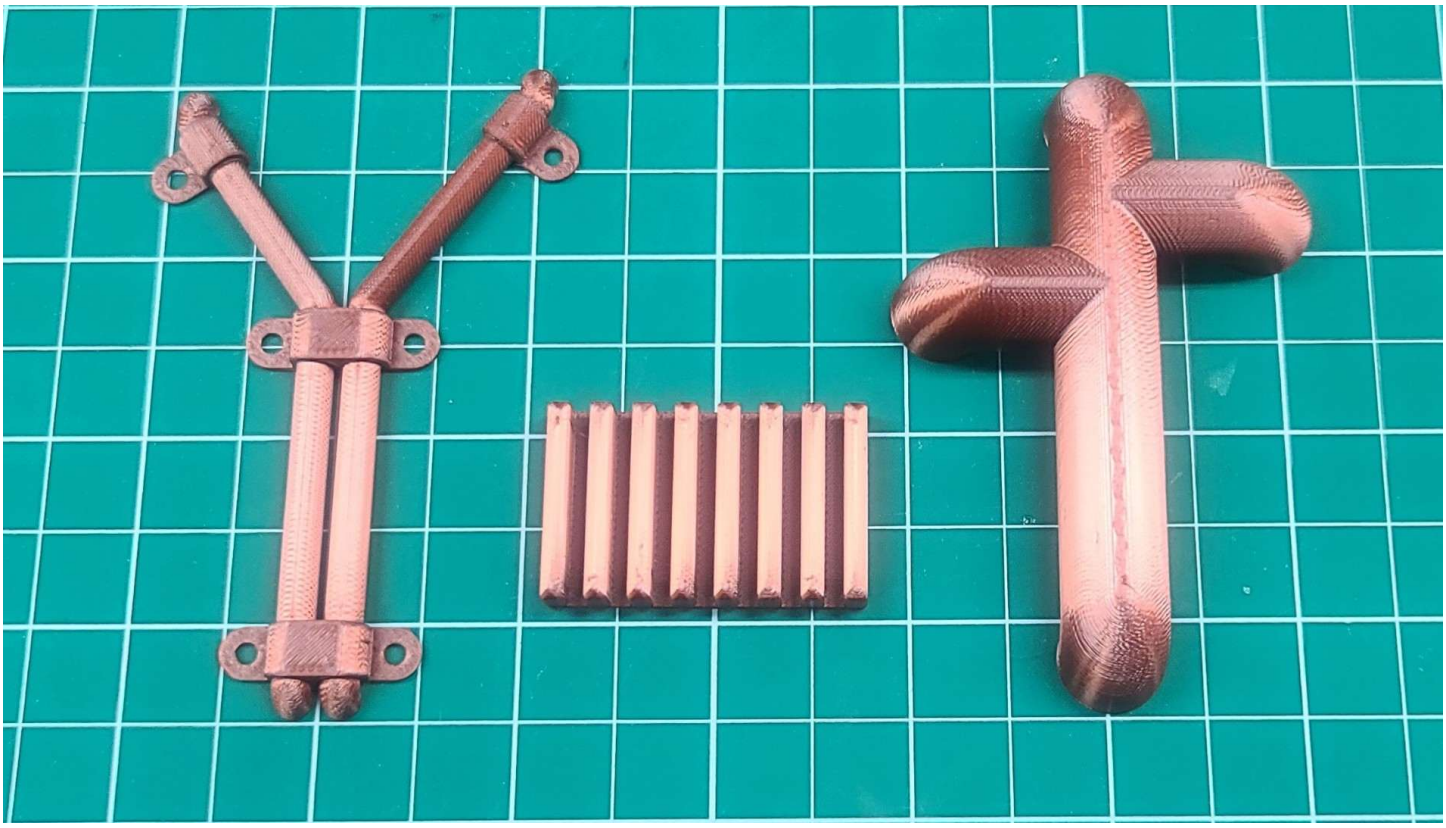


Figure 5 – Steam Machine Puzzle Box Copper Silk PLA Parts

As noted earlier, to print the various steam pipes on Side 1, Side 3, S1 Drawer Lid, and S3 Drawer Front, I decided to modify the related STL files by separating the portions of each part to make two Creality Print Project (.3mf) files, one for the base Glitter Twinkling Dark Gray PLA, and the other for the upper Copper Silk PLA portions of the part. I then printed all the project files requiring the Copper Silk PLA filament. The resulting 11 parts can be seen in Figure 6, which took 3h 10m to print.

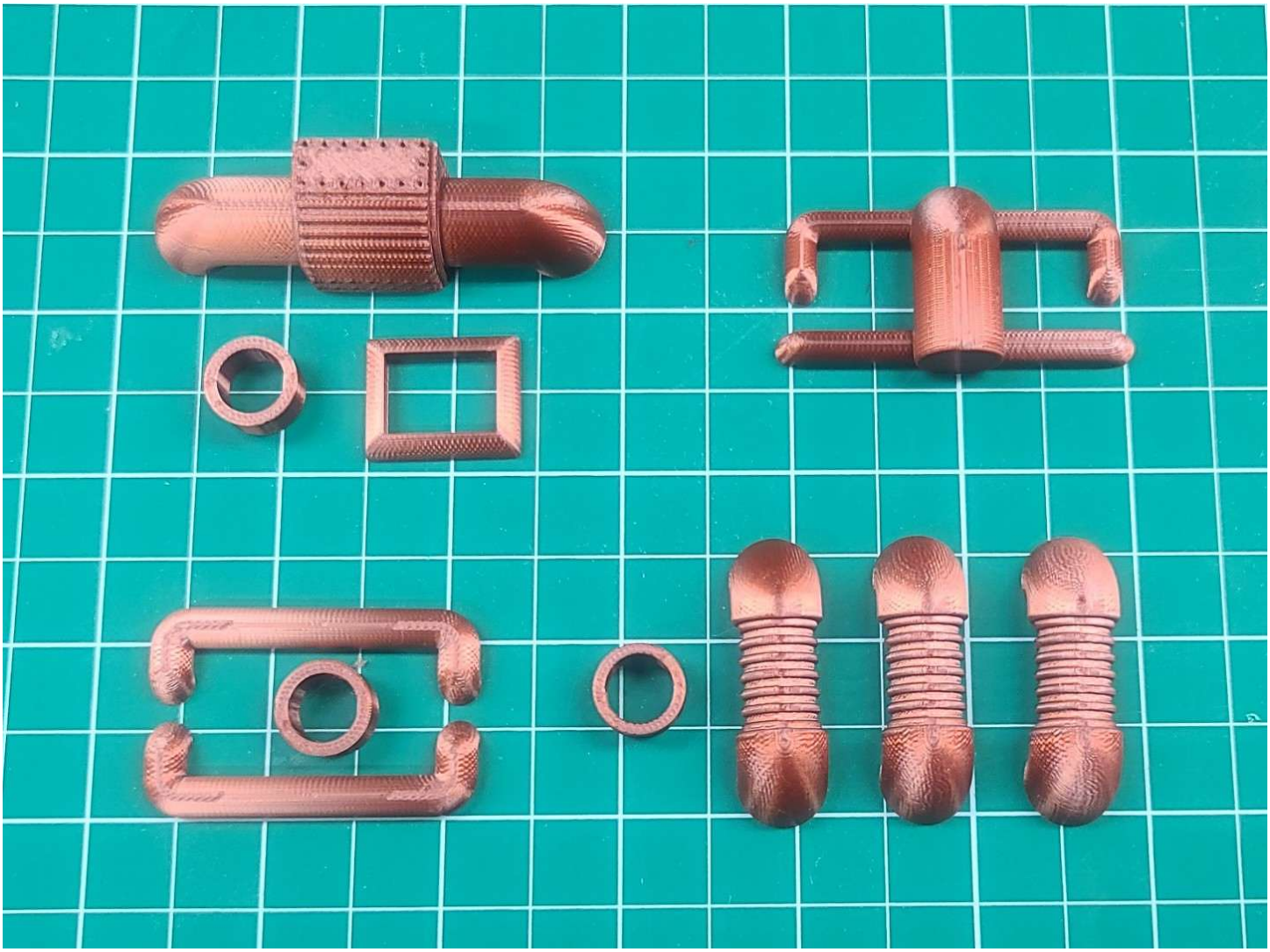


Figure 6 – Various Upper Copper Silk PLA Parts

With the various colors of Silk PLA parts finished, it was time to print the **45** internal parts of the Steam Machine Puzzle Box using Creality Black Hyper-PLA until that spool was empty and then I used a new spool of eSUN Black PLA+ Filament. The layer heights and infill densities for all the internal parts were varied based on the parts' function and strength needed. **NOTE** - To get the small fine threads on part S4 Big Gear Disk to print properly, you should enable supports. As you can see on the right side of the screenshot shown in Figure 7, I used the "Tree(auto)" and "Tree Hybrid" settings in Creality Print 6.3. Results of the 45 internal parts 3D printing can be seen in Figures 8 - 13.

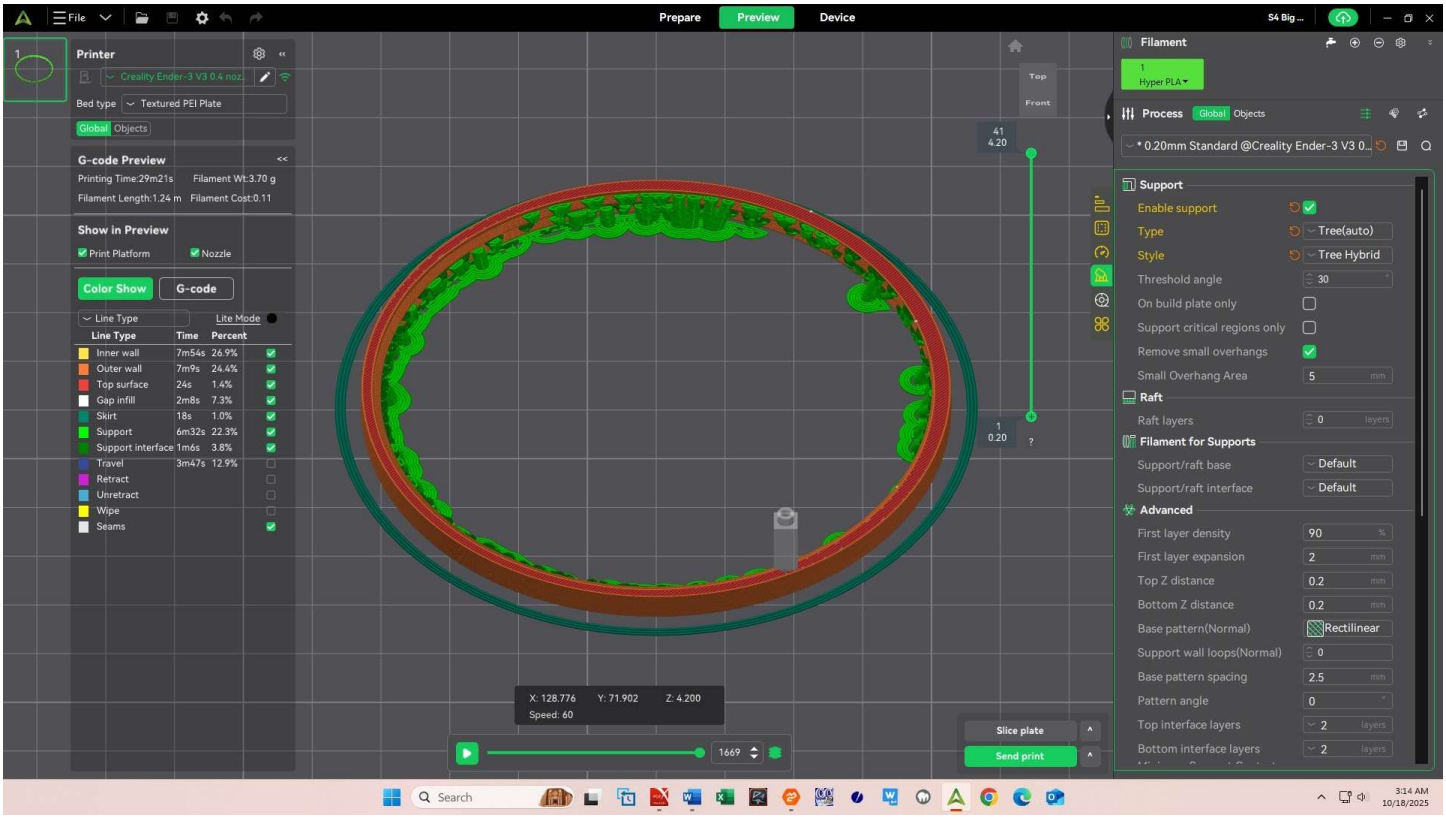


Figure 7 – S4 Big Gear Disk Printing Set-Up Screenshot

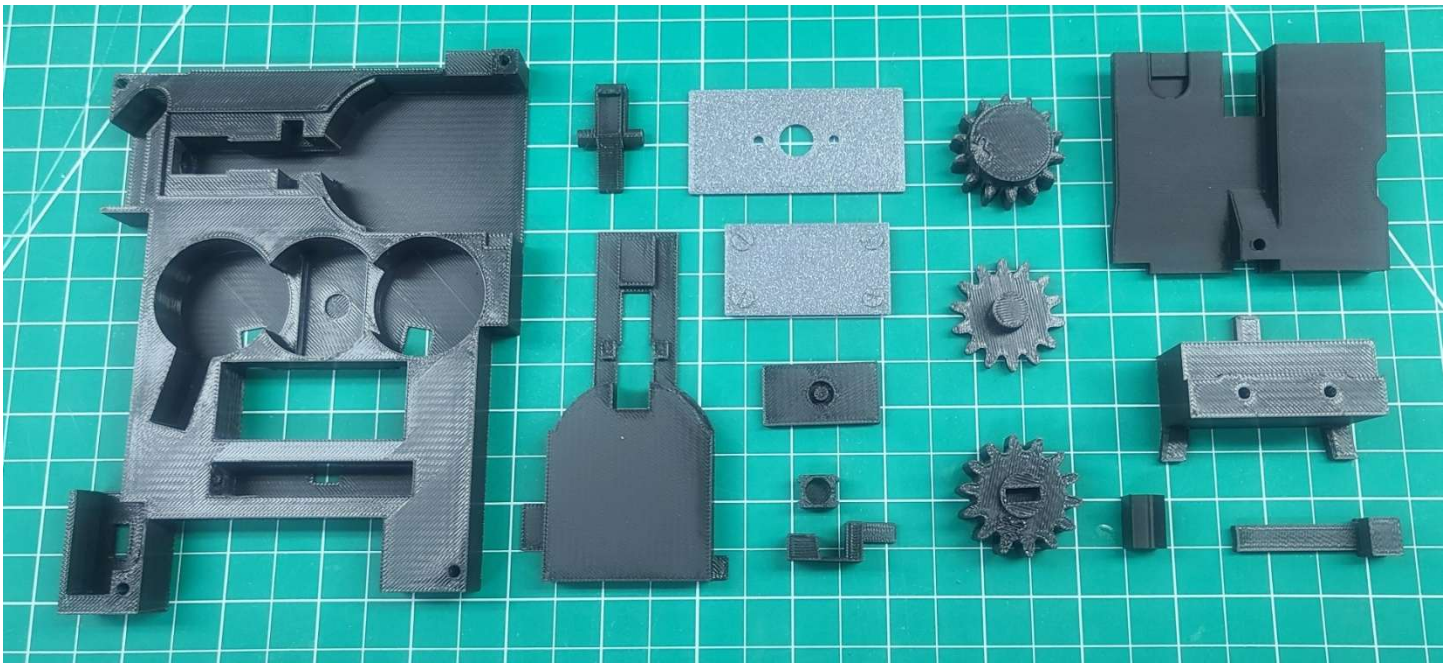


Figure 8 – S1 Parts

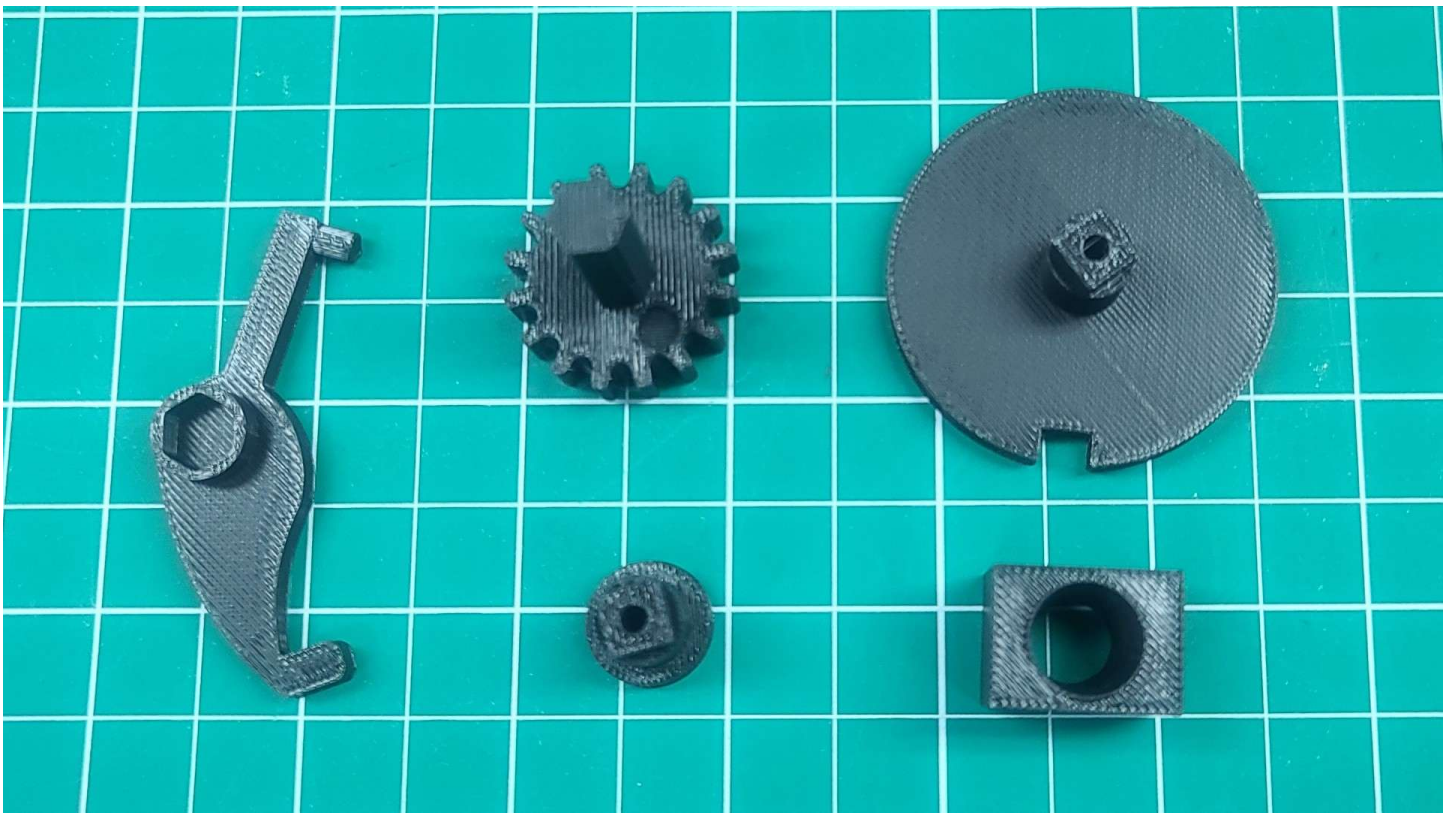


Figure 9 – S2 Parts

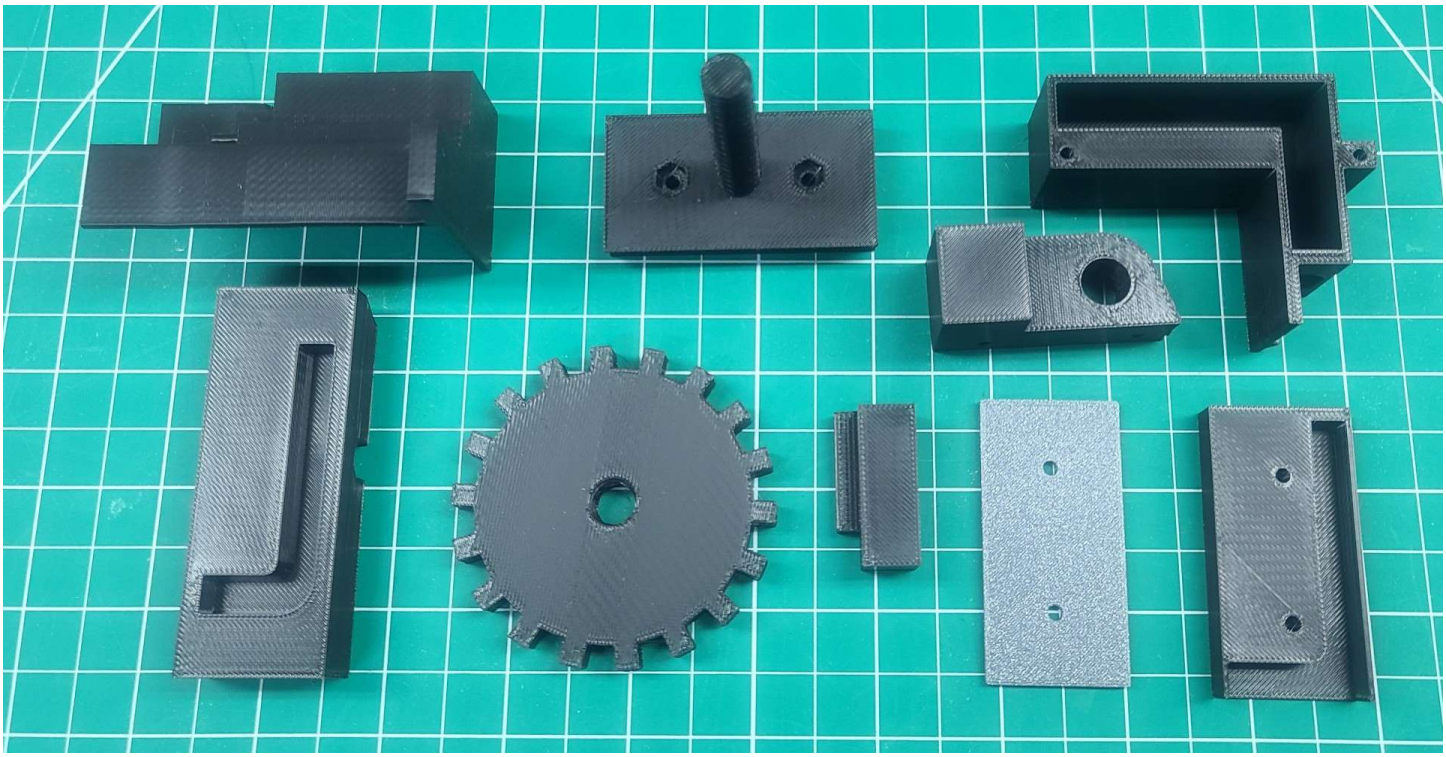


Figure 10 – S3 Parts

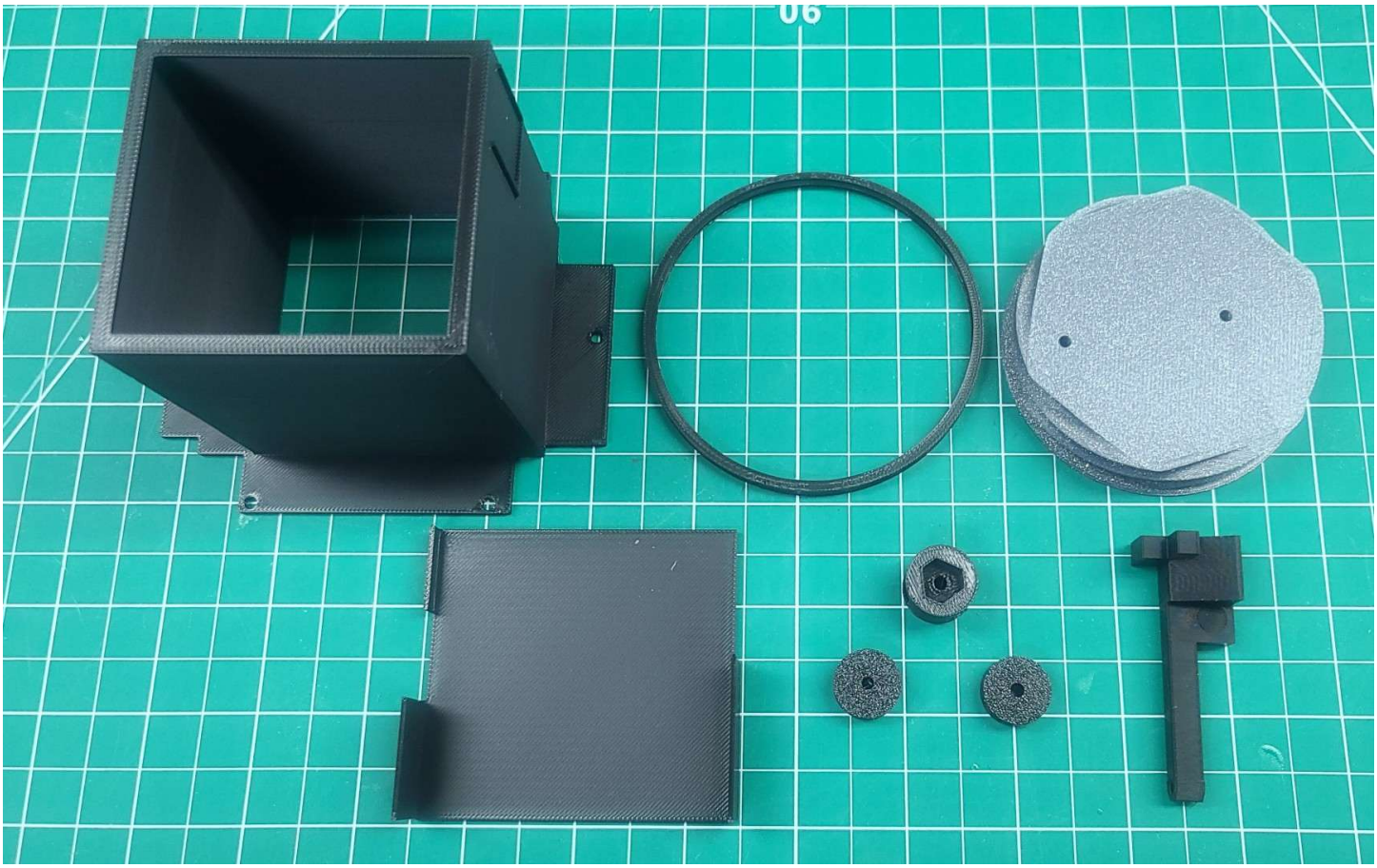


Figure 11 – S4 Parts

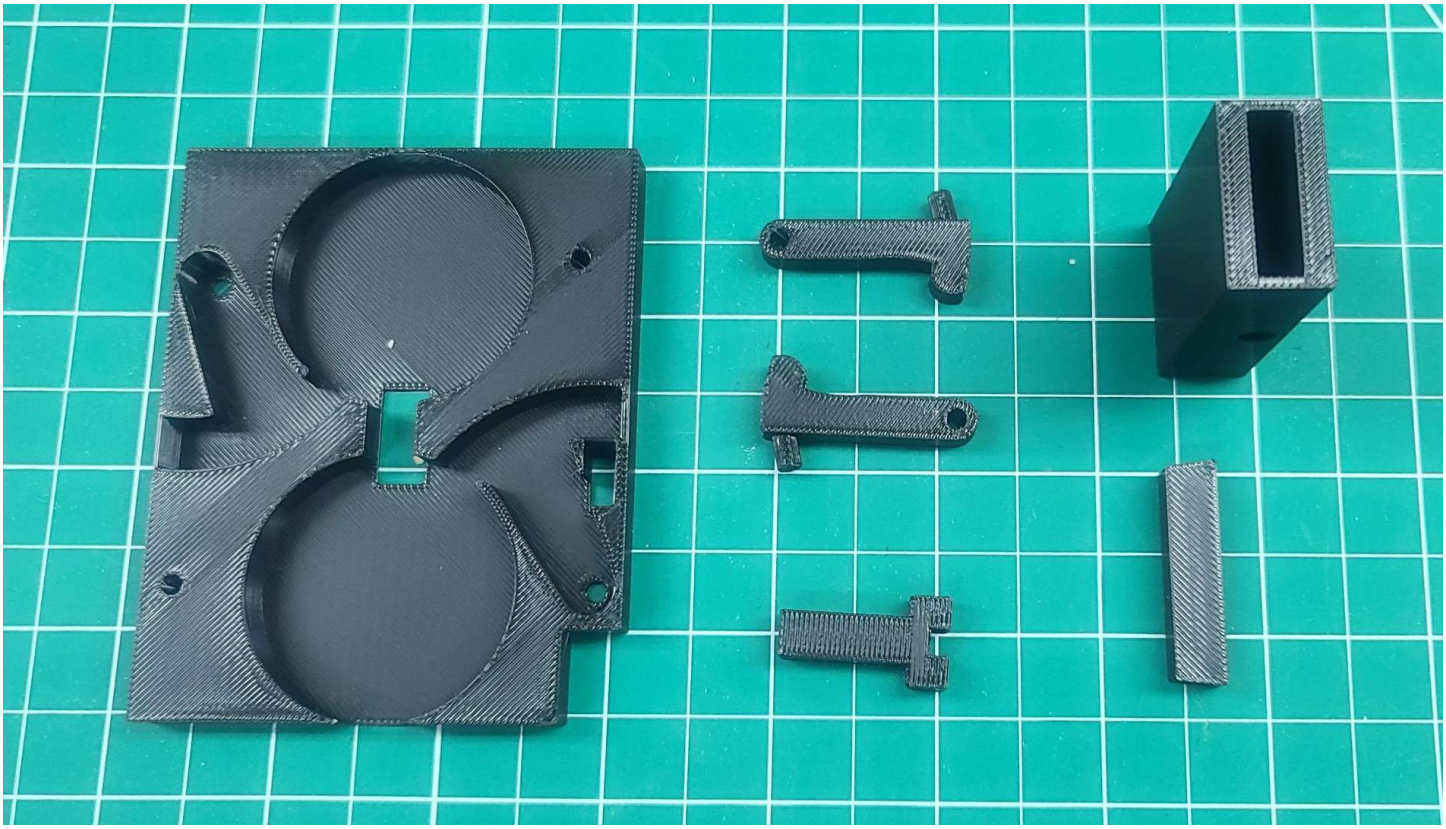


Figure 12 – S5 Parts

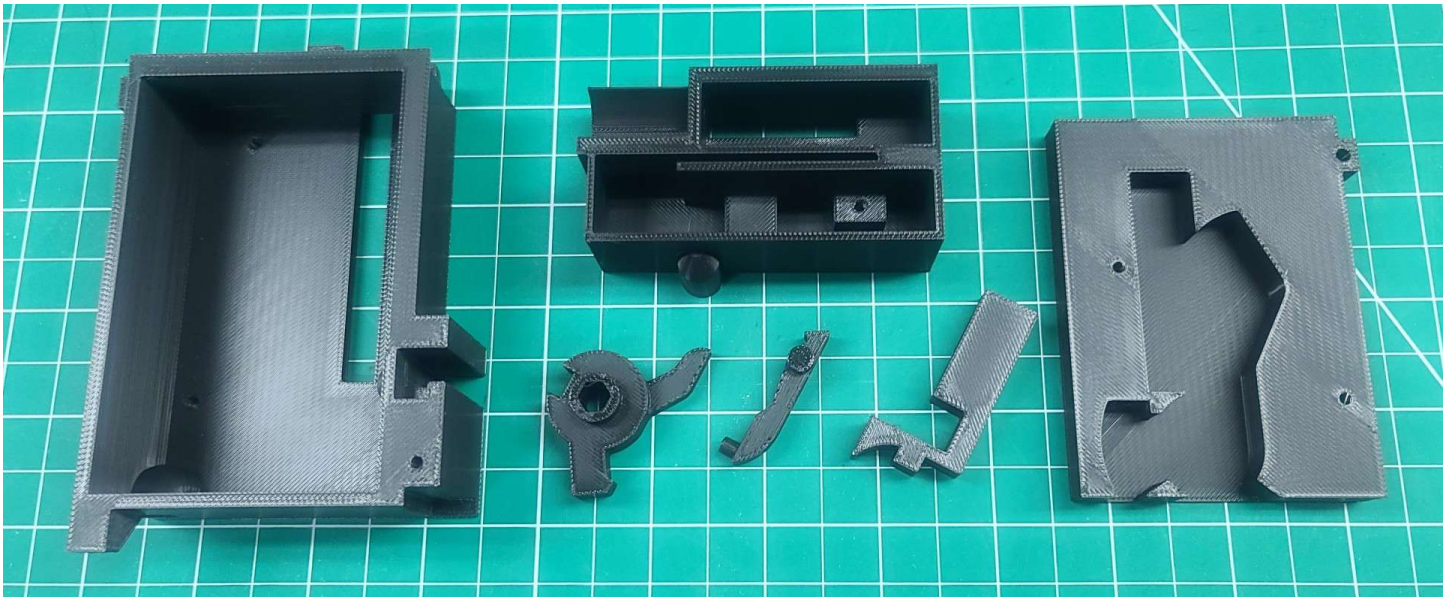


Figure 13 – S6 Parts

Finally, it was time to print the six large side parts. Once again I decided to use the "Variable Layer Heights" (https://www.youtube.com/watch?v=jtbcYLDfg14&t=53s) function in Creality Print 6.3, adjusting layer heights in different sections of the side parts resulting in smoother surfaces, faster print times, and less filament use, all while maintaining high detail where it matters most. Print times for the six side parts averaged around two hours each, and you can see the final results using the ELEGOO Glitter Twinkling Dark Gray PLA filament in Figure 14 below.

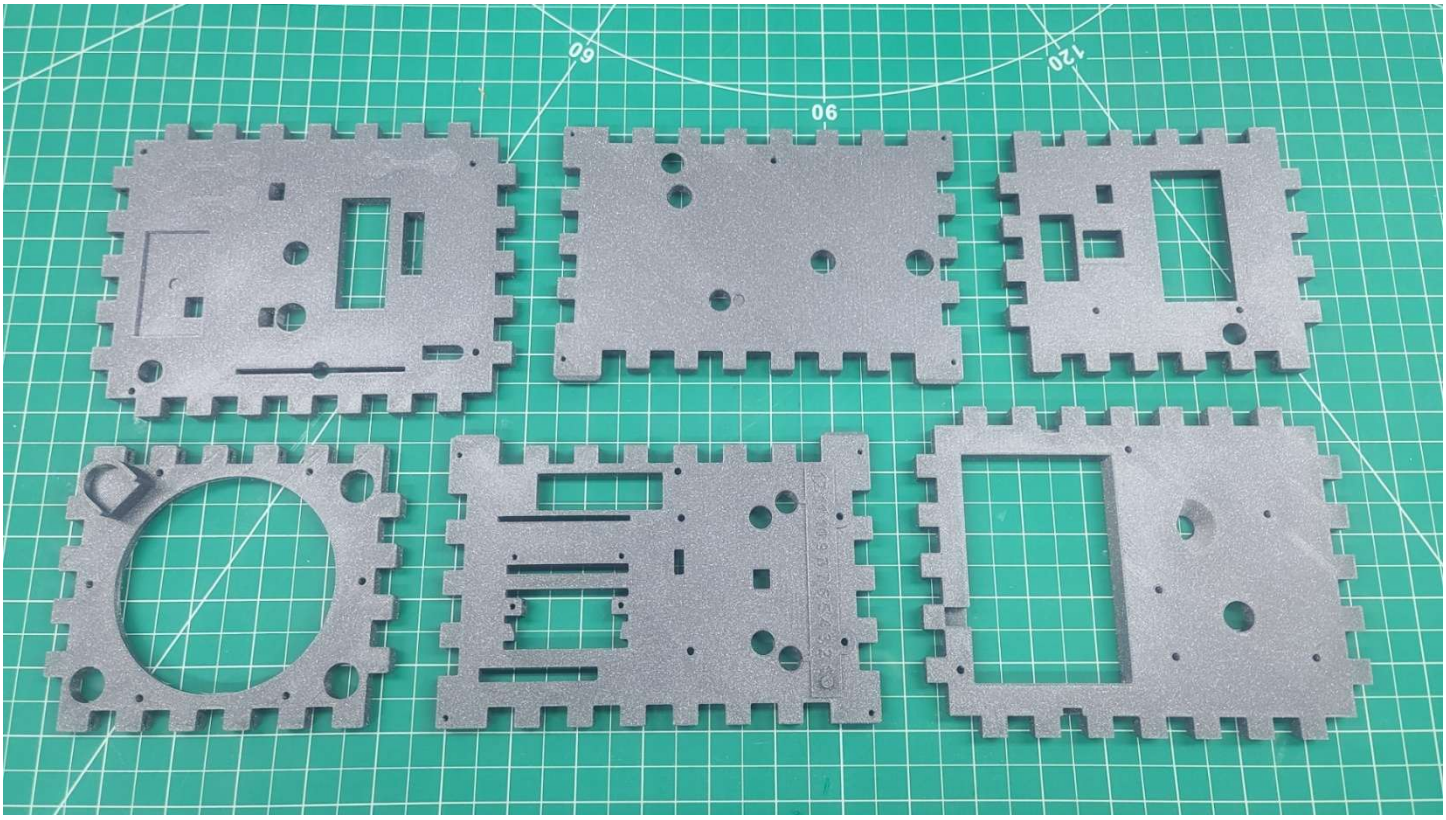


Figure 14 – Steam Machine Puzzle Box Glitter Twinkling Dark Gray PLA Sides

With all the 3D printed parts finished, the next thing on the list was to put all the various parts together. I'm not going to go through all the steps of my Steam Machine Puzzle Box assembly. The provided instruction manual covers the assembly in a lot of detail and the online YouTube video assembly instructions are great, which you can view @: https://www.youtube.com/watch?v=TeacCcr3cA0. One thing I will mention about the puzzle box assembly. I highly recommend you run a 3M tape into the various holes in the pieces that receive a 3M screw. This makes the assembly **MUCH EASIER**.

Overall, the 3D printing was straight forward as long as you follow all the print setup recommendations in the instruction manual. All required hardware items were available on Amazon, as were the various PLA filaments I used. The puzzle box design engineering and 3D modeling is excellent, and everything fits together and functions like a champ! I highly recommend this puzzle.

I guess I should provide a couple images of my finished product. Below in Figures 15 & 16 you can see all six sides of my 3D printed Steam Machine Puzzle Box. I hope you have fun making one for yourself.

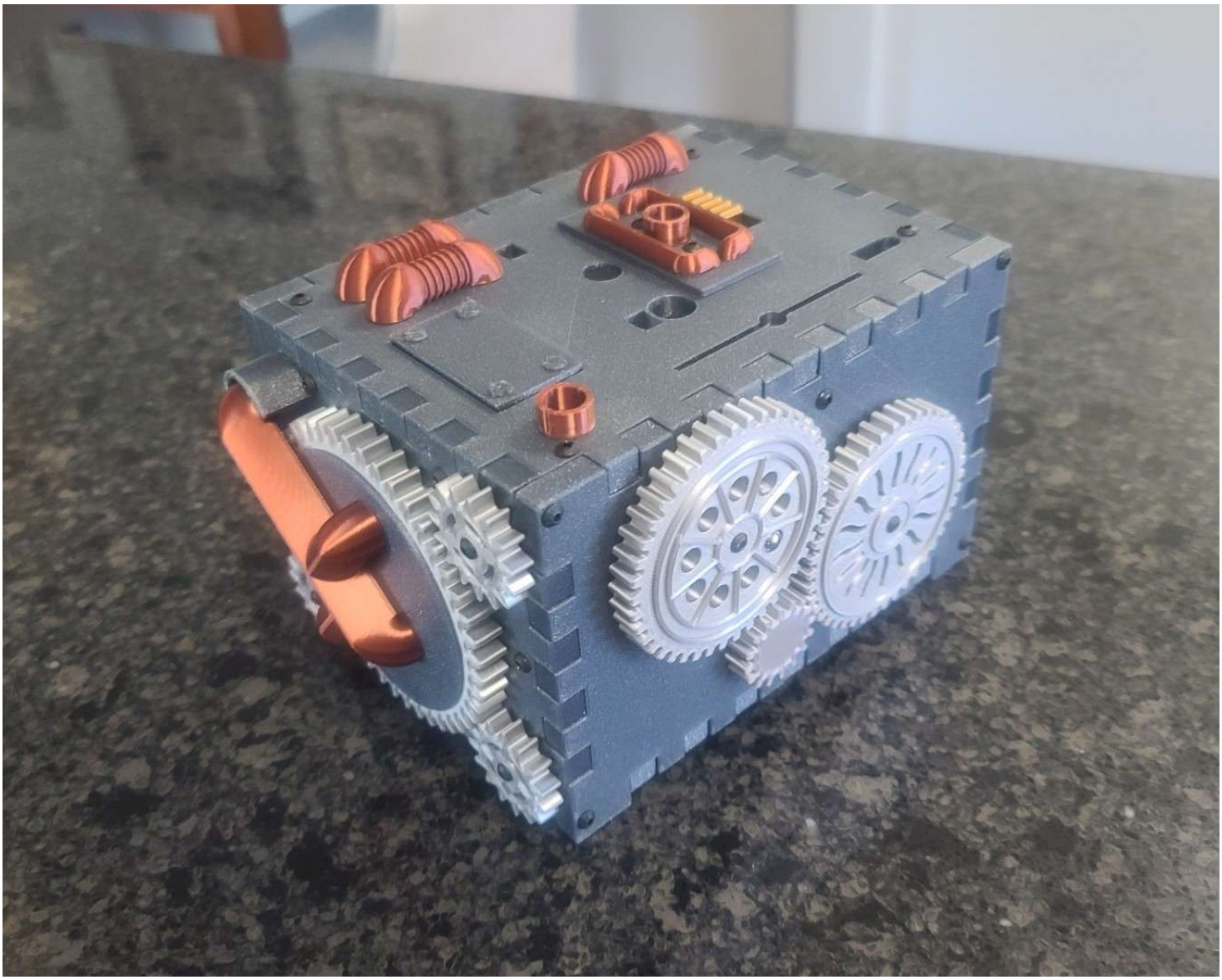


Figure 15 – Three Sides of my Steam Machine Puzzle Box

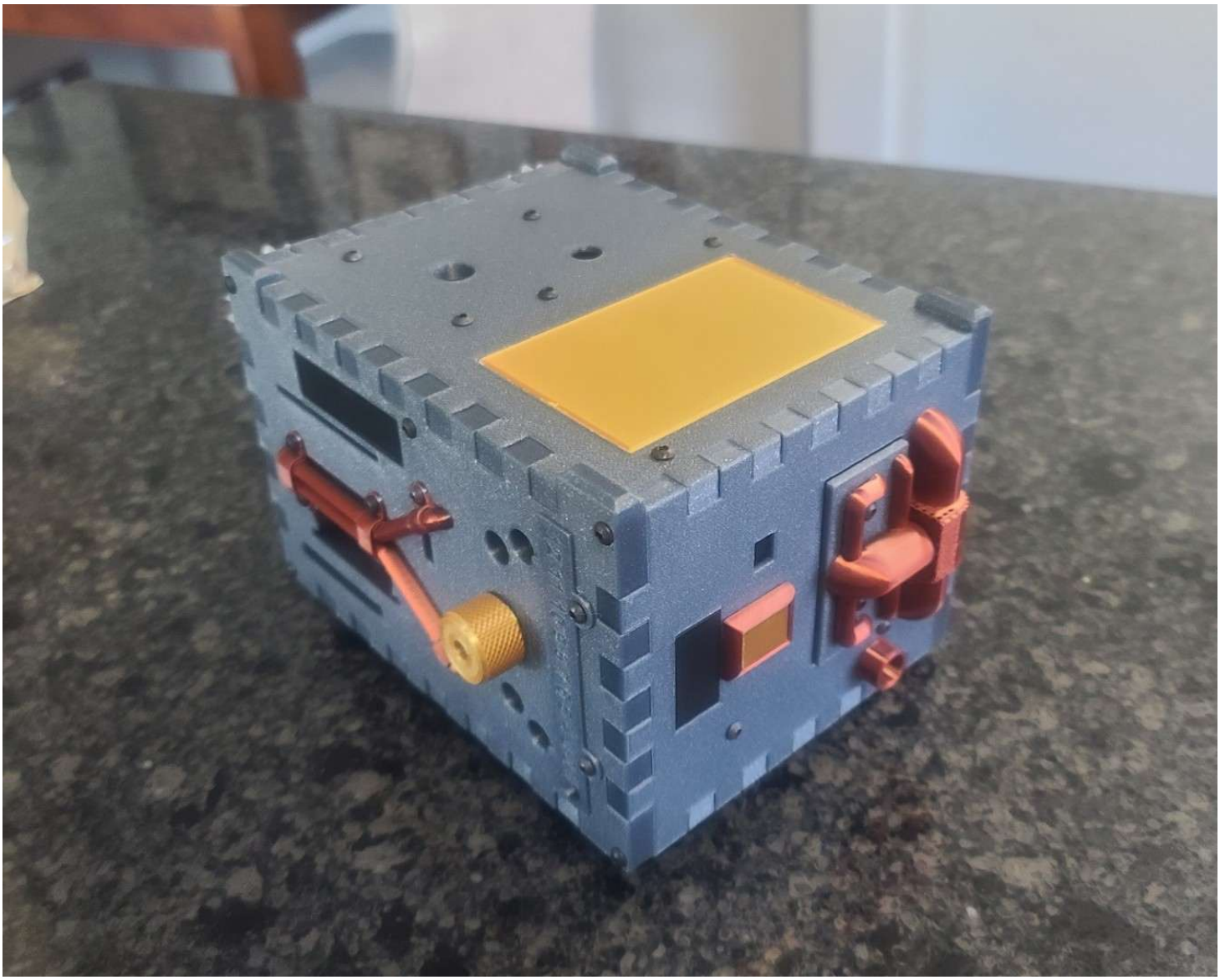
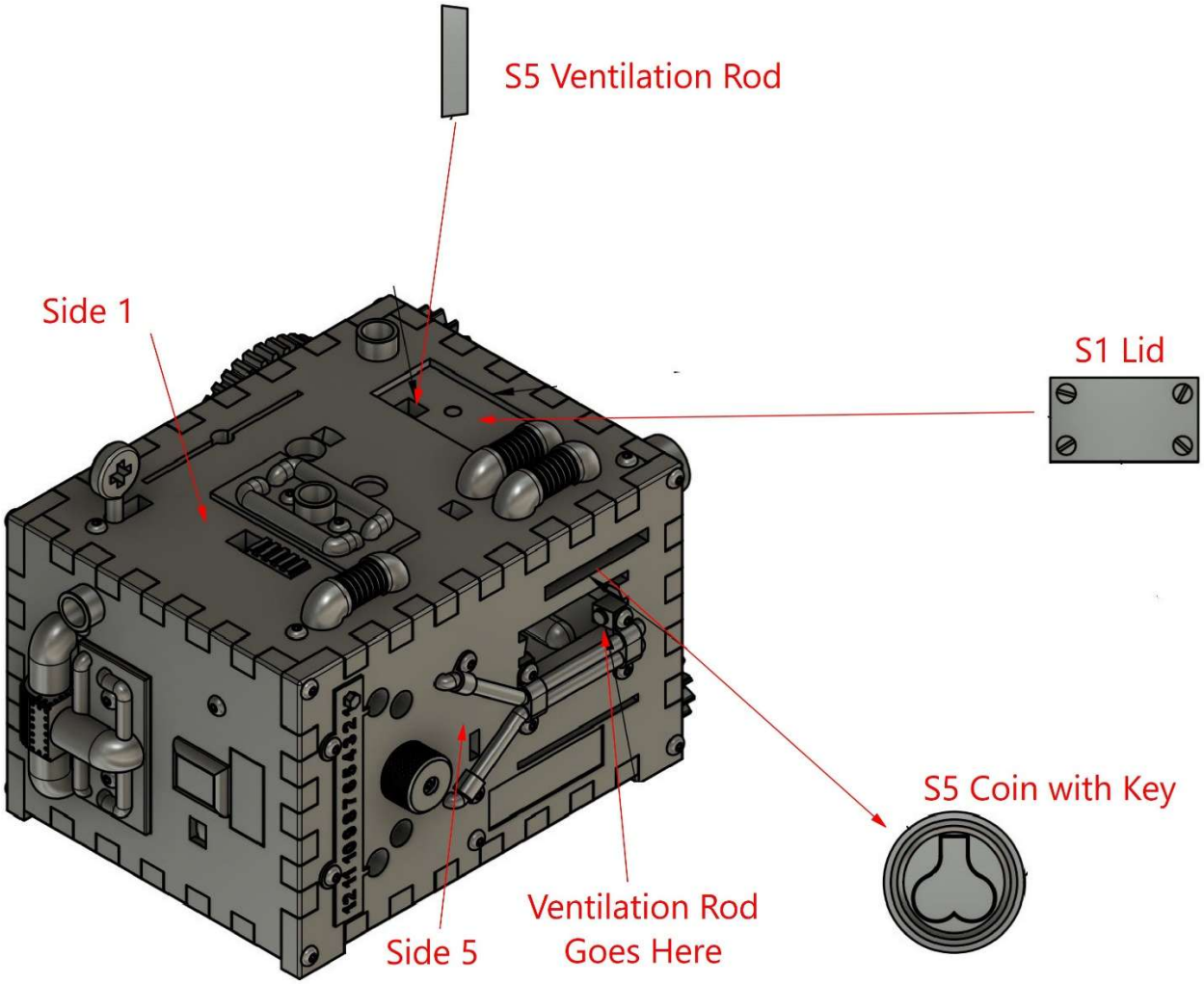


Figure 16 – The Other Three Sides of my Steam Machine Puzzle Box

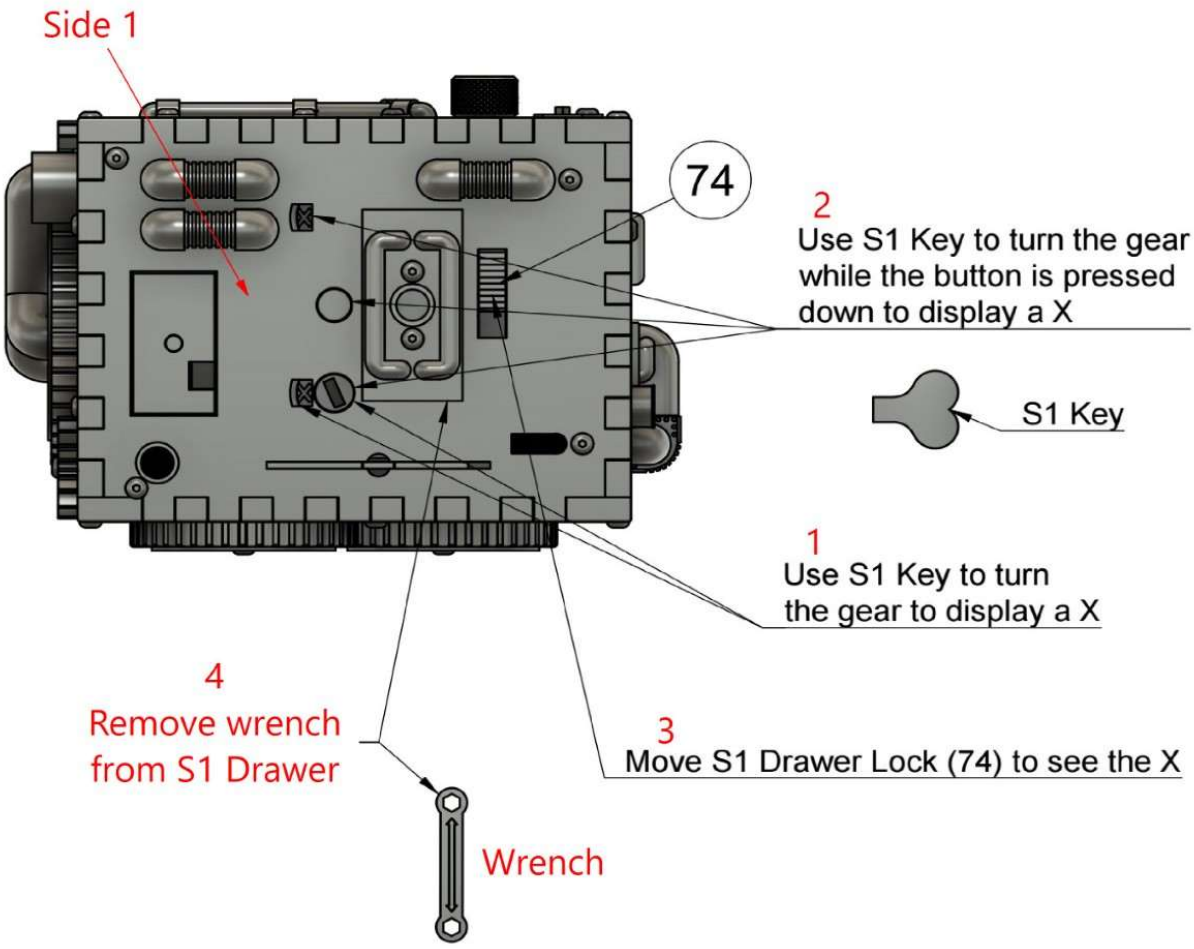
Steam Machine Puzzle Box Solution Guide



Remove the S5 Ventilation Rod (small black rectangle rod with magnets at each end) from Side 5.

Lift a small gray rectangle S1 Lid off of Side 1 and insert the Ventilation Rod down into the square hole.

Push down on the Ventilation Rod to release a gold Round Coin with silver Key from a slot on Side 1.



Note – In step 2 in the image above, use the S5 Ventilation Bar to press down the button.

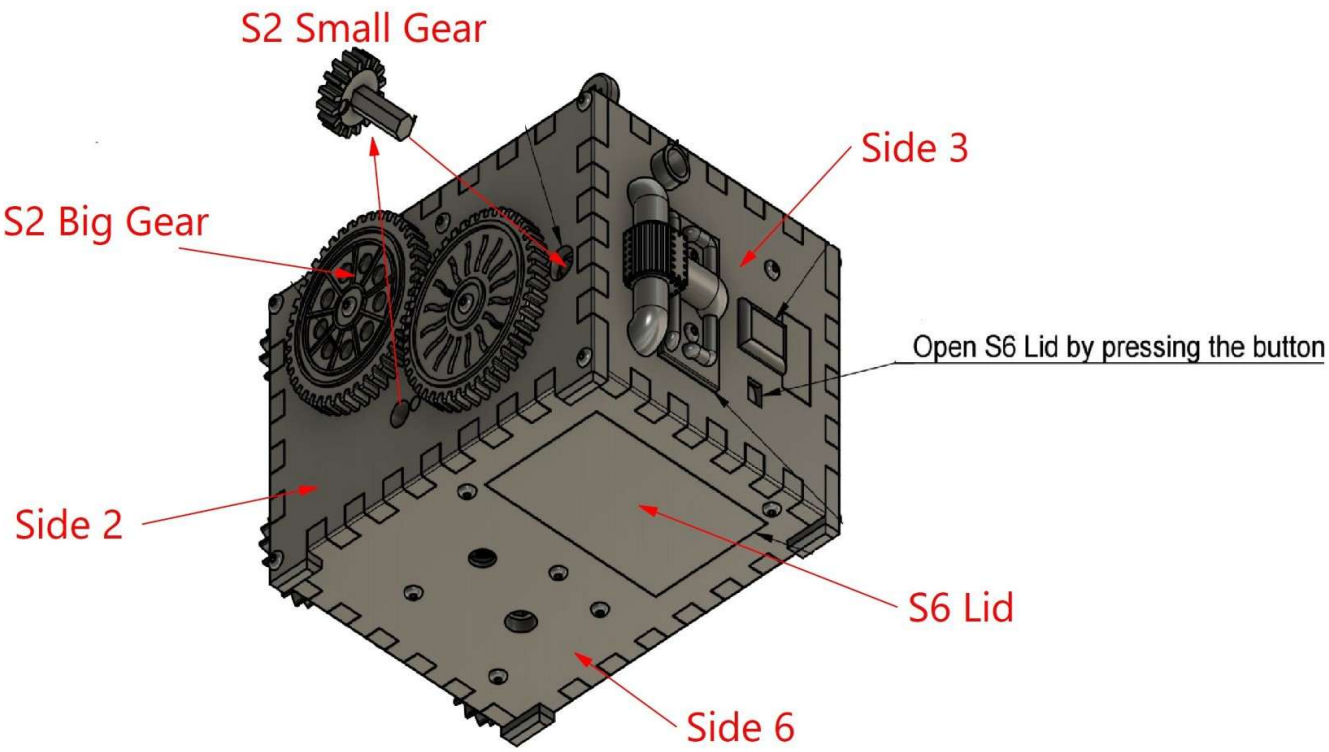
For step 4 in the image above, after moving the gold S1 Drawer Lock (74) to see the X in step 3, pull up on the Copper Pipes S1 Drawer to remove a silver Wrench from under the top of S1 Drawer.

Now take the Wrench and place one end on the post at the end of the "Number Bar" on Side 5 and read your **first code number** with the other end of the wrench.

Using the S5 Ventilation Bar, press in on a square hole on Side 3, which will release a gold drop-down panel on Side 6.

Again, take the Wrench and place one end on the post at the end of the "Number Bar" on the underside of the Side 6 panel and read your **second code number** with the other end of the wrench.

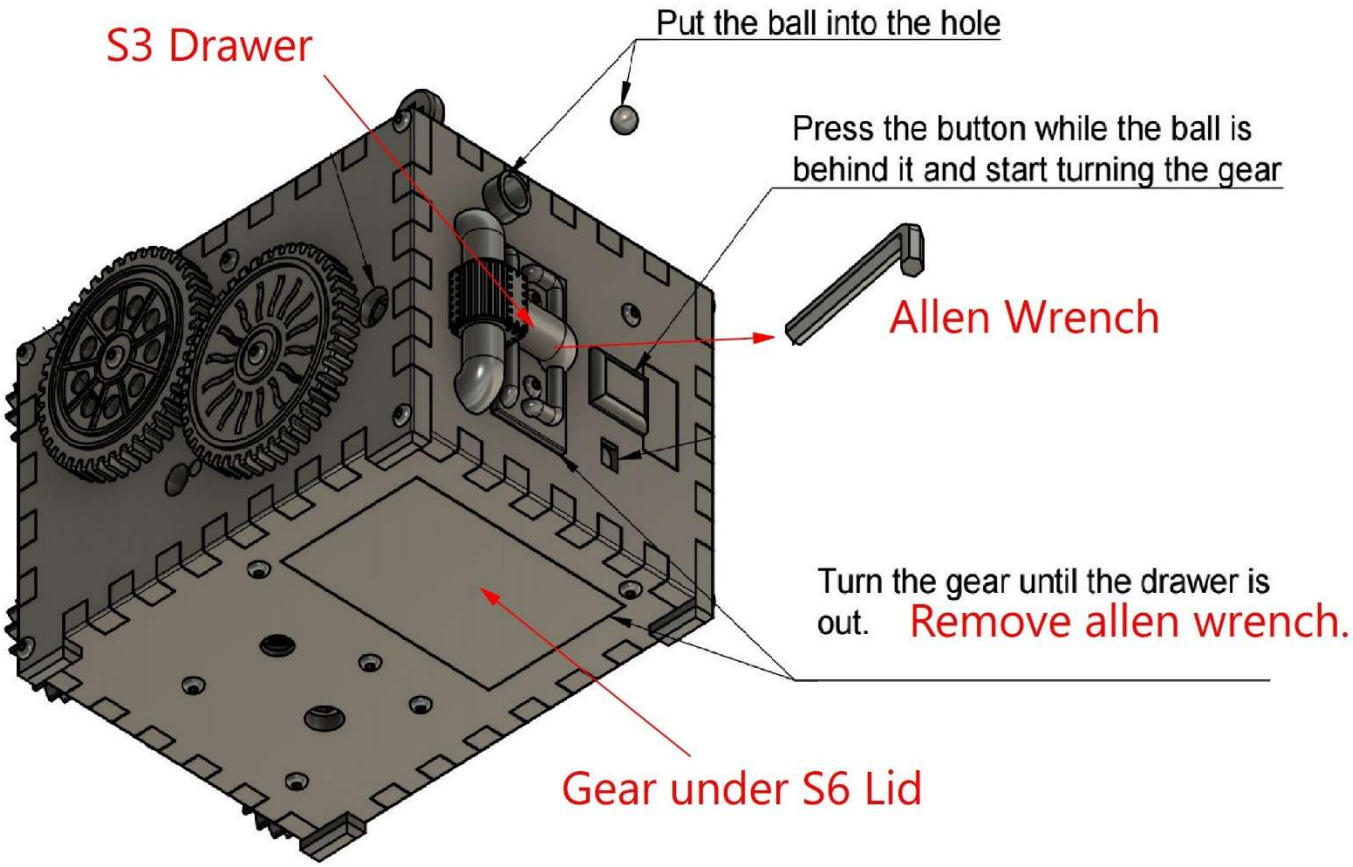
Note – Inside the compartment below the Side 6 drop-down panel you will also find a black gear which will not turn at this time, but it will be used in a later step.



Next, move to Side 2 which has two silver Big Gears and one silver Small Gear. These gears do not turn at this time.

Find a small metal ball behind one of the S2 Big Gears. Pull out the S2 Small Gear (only held in please by a magnet), insert it into the hex hole next to a Big Gear, then press down on the S2 Small Gear to unlock the S2 Big Gears so they can be rotated.

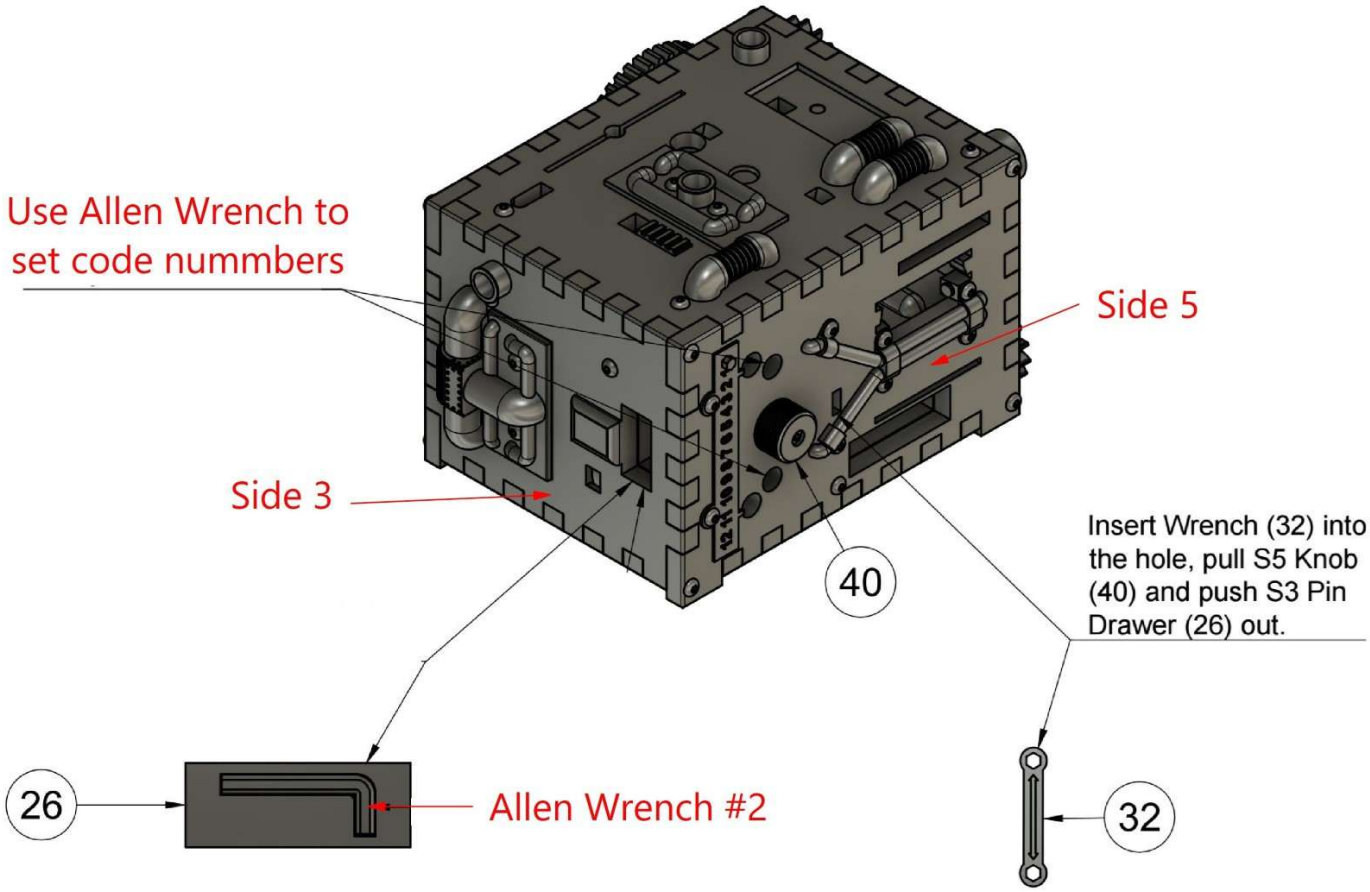
Rotate the S2 Big Gears until the metal ball drops down into a hole behind the gear and falls out of a copper pipe on Side 1 of the puzzle box.



Now take metal ball and insert it into a round copper pipe on Side 3.

Rotate puzzle box around until metal ball moves behind the large button on Side 3, then press the button down to unlock large black gear under the S6 Lid. **Note** - If pressing the Side 3 button down does not unlock the Side 6 gear, the metal ball is NOT behind the button, so move puzzle around until it is.

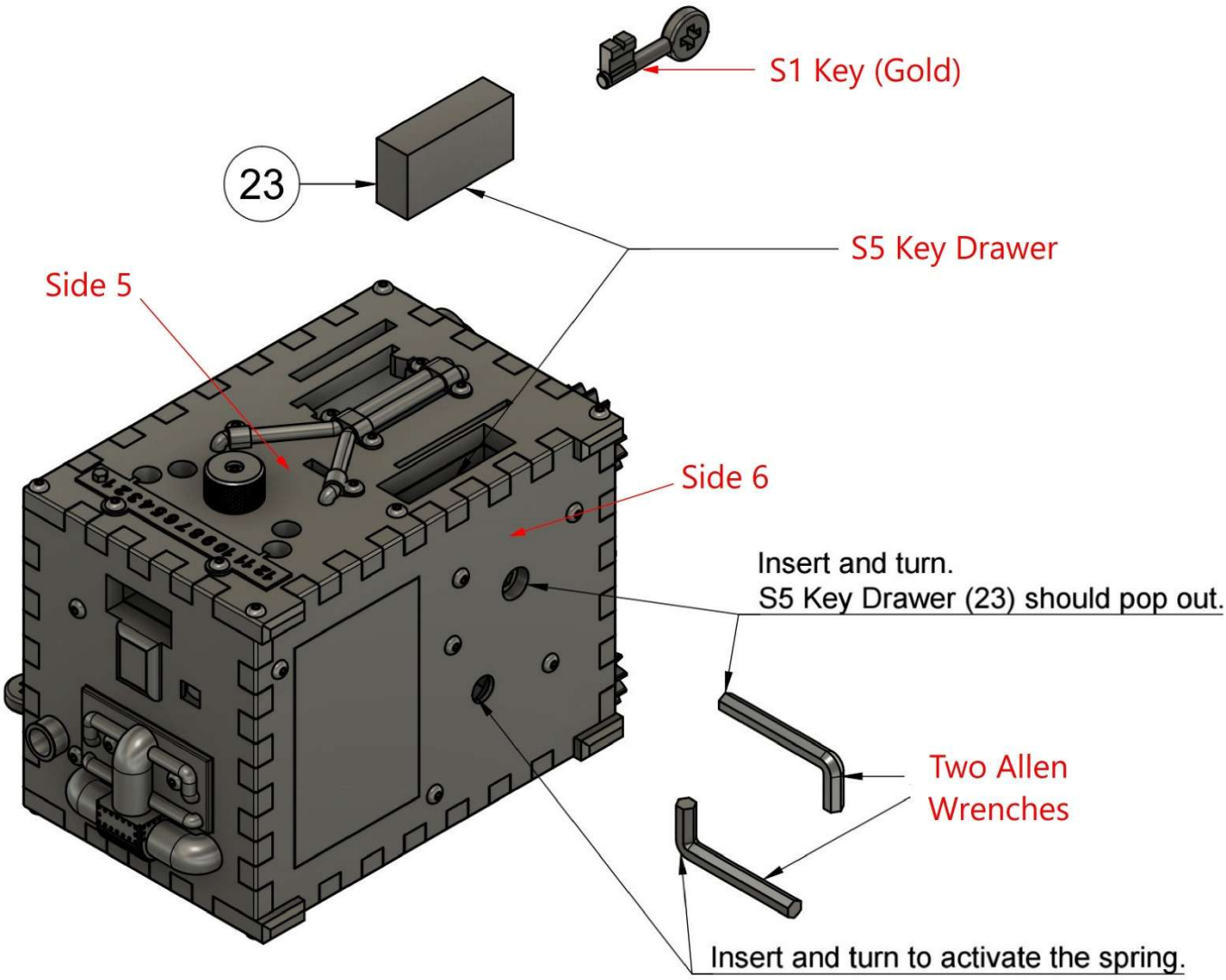
While pressing down on the Side 3 button, turn large Side 6 gear until S3 Drawer is moved far enough out from Side 3 to remove a silver Allen Wrench inside the drawer.



Now take the Allen Wrench and set the two gold dials on Side 5 to the two "Code Numbers" you found earlier.

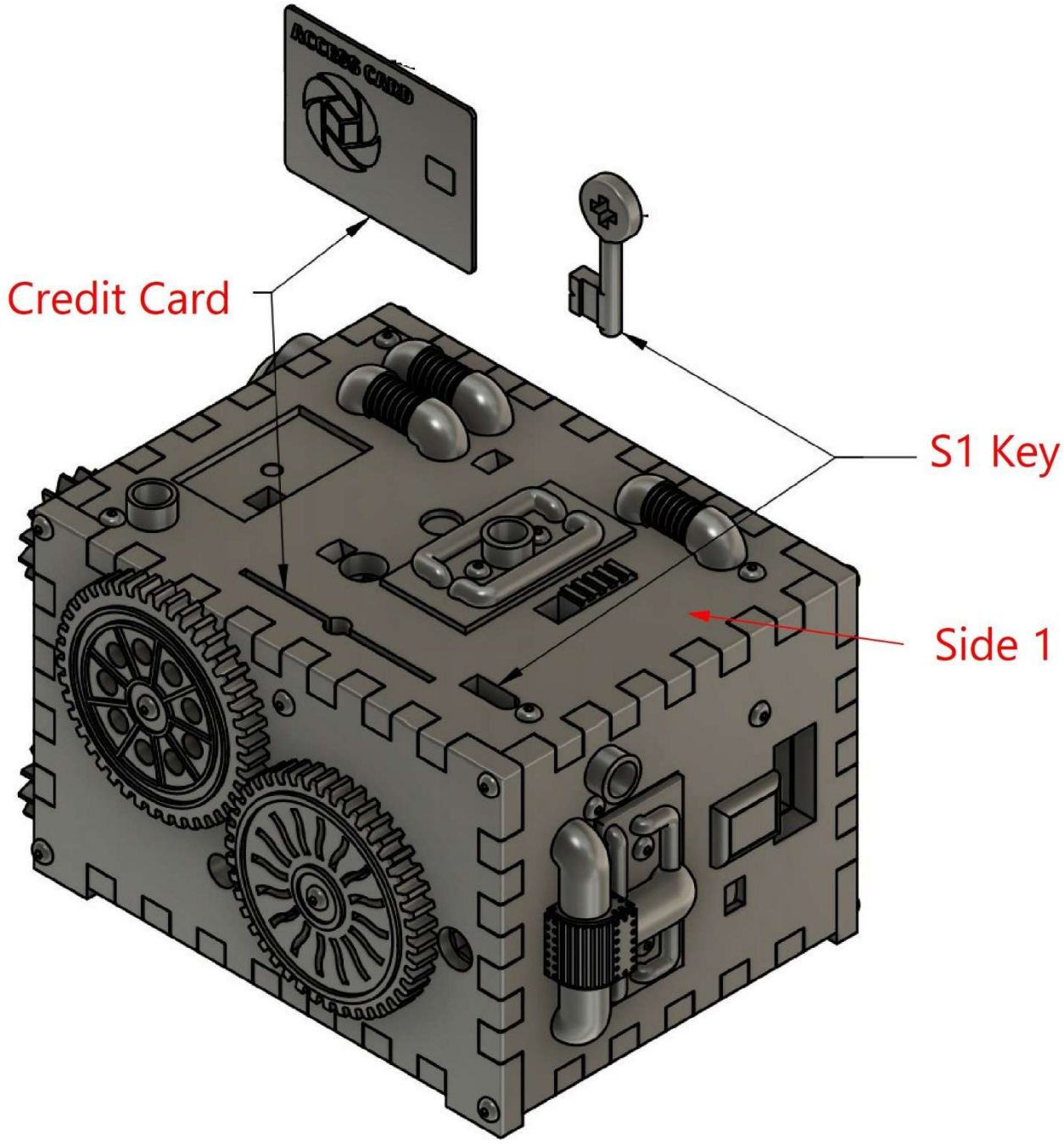
Insert and hold the Wrench into a small slot on Side 5, then pull up on the large gold S5 Knob to release the black S3 Pin Drawer.

Remove another silver Allen Wrench from the drawer.



Using the two silver Allen Wrenches, insert into the holes on Side 6 as shown in the image above and turn to unlock the S5 Key Drawer.

Remove the Key Drawer from the puzzle box and slide out the gold S1 Key.

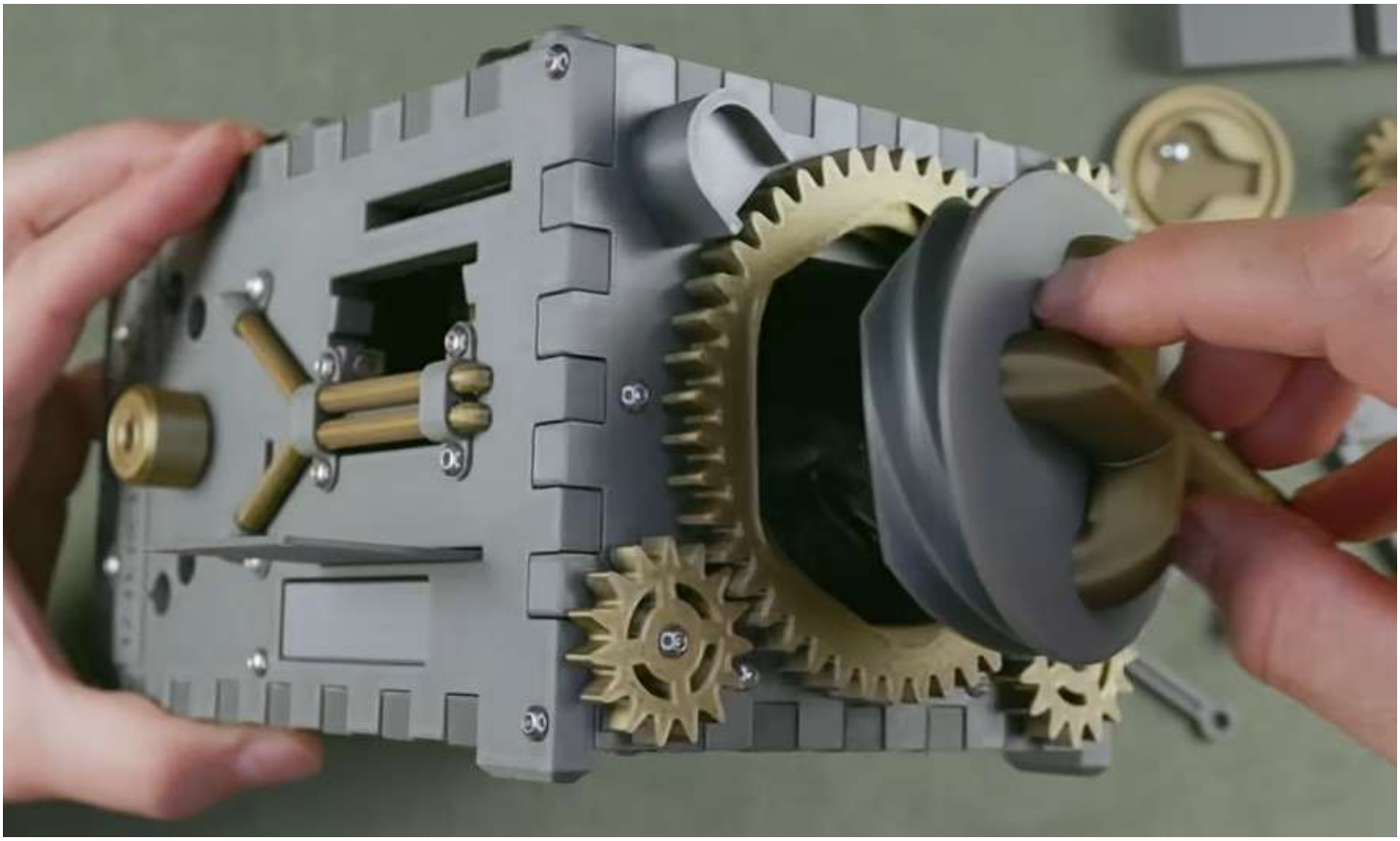


Now take the gold S1 Key and insert it into the key slot on Side 1.

Turn the S1 Key "counterclockwise" to unlock a gold Credit Card, which should pop up out of Side 1.

We are almost there.

Take the Credit Card and insert it down into a slot on Side 5 to unlock the Side 4 gears so they can be rotated.



Now rotate the Side 4 silver S4 Big Gear to back out the S4 Chamber Lid with copper pipes on top.

Remove the S4 Chamber Lid to obtain access to your prize.

Congratulations!!