# The Wilson Thrust

# Printed Parts Guide

## Version 1.0

**Warning**: Please keep in mind that this is a complex build and will require a lot of work. Many of the steps are, at best, described as “Fiddly”. The design is also ever changing as this is not in any way a finalized design. Attempt at your own risk.

## Step 1. Print Parts

A picture containing graphical user interface

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All files that need to be printed are in the following location in this project

\WilsonThrust510\Print Files\Current\

From here, parts are broken up into groups based on different parts of the throttle. I’ve provided 3MF and STL versions of all the files. While you can use the STL file versions, it’s recommended that you use the 3MF versions as orientation is only guaranteed to be correct with these versions. Print all parts in the orientation they are in by default when opening the 3mf files.

What to Print Notes:

* The “Hats and Caps (Resin)” folder is only needed if you want to print higher detail hats and/or plan to put LEDs under the push button caps on the grip. If you plan to put LEDs under your push buttons, you’ll need to print these push button caps with transparent or only mildly opaque resins. LEDs are white so the color or your resin will determine the color of the light emitted.
* For the “Hats and Caps (FDM)” prints, you have to print all of the following:
  + Kailh Plunger Under
  + Kailh Plunger Cap Mid
  + Kailh Plunger Cap Top
  + Kailh Plunger Pinky
  + Joystick Cap
  + Slider Cap
  + 3-Way Trimmed CH Hat

But you have a choice regarding what style hats you’ll want for the two 5-way switches on the right of the grip and the one 5-way switch on the front. You’ll need to print a stem for each so print four copies of “Square Stem Brace”, one for each 5-way hat and another for the 3-way Trim CH” hat. You may then pick three of the following hats to use in your design (more options to come):

* + 5-way Edge Dome Hat
  + Textured Walled Dome Hat
  + Virpil Round Pyramid
  + Virpil Square Pyramid

Slider Setting Notes:

* Almost all parts will need supports both from the print bed and from parts on the print bed.
* The layer height is up to you and the level of detail you’d like to have for curved surfaces. I’d recommend a layer height of .2 mm or lower.
* For infill, I’d recommend at least 45 % but, if you have trouble with your prints, increase this.
* The “Hats and Caps (Resin)” folder is only needed if you want to print higher detail hats and/or plan to put LEDs under the push buttons on the grip.
* Tolerances are razer thin for a lot of these parts so make sure you have your printer settings dialed in before attempting. All parts have been calibrated for an expansion of .125 mm between on all sides. Resize parts if needed.

## Step 2. Post Processing

* Remove all supports
* Sand all parts to your desired smoothness. Make sure to pay special attention to:
  + Sections that will come in contact with other printed parts
  + Sections that needed supports and show any “sagging”, especially if it is printed threading

Press parts together that will be in contact to make sure they fit together. Sand parts that are not fitting together until they do.

* At this point, you could be done with post-processing but I at least like to put some sort of paint on to seal the print.

For those curious, my process for finishing a part is

* Sand with 120 grit
* Sand with 240 grit
* Spray two coats of Primer Filler
* Sand with 320 grit
* Spray with two coats of Primer Filler
* Airbrush with final color choice
* Spray with two coats of protective topcoat (matte or glossy)

## Step 3. Add Threaded Inserts

I will now show all spots where threaded inserts need to be placed. Below are images of each part that needs inserts and where those inserts should be placed. I’ve broken them down by size of insert.

**M2 Inserts**

Grip Front Block Shell (8 M2 Inserts)

A close-up of a device

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Grip Big End (6 M2 Inserts)

A picture containing text, sky

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**M3 Inserts**

Grip Big End (1 M3 Insert)

Engineering drawing

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Grip Main Shell (13 M3 Inserts)

A picture containing diagram

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A picture containing sky, air

Description automatically generated

Diagram

Description automatically generated

A picture containing accessory, bag

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Arm Shell (2 M3 Inserts)

Diagram

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Main Throttle Post and Side Throttle Post (4 M3 Inserts)

Diagram

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**Box Bottom Shell (15 M3 Inserts)**

A close-up of a machine

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Diagram

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**M5 Inserts**

**Box Bottom Shell (5 M5 Inserts)**

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**M6 Inserts**

**Small Throttle Axle Bearing Outside (1 M6 Insert)**

A close-up of a car tire

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## Step 4. Add UHMW tape

This tape is added to reduce sticking when tension/friction is increased on a throttle arm. Unroll a section of the UHMW tape with paper side up. Place the Small Throttle Axle Bearing Outside on the UHMW tape, round solid side down. While holding the Small Throttle Axle Bearing Outside down on the tape, use a pencil to trace the circle of the Small Throttle Axle Bearing Outside on the paper side of the UHMW tape. Now do the same for the solid, round section of the Arm Shell on a different section of the rolled out UHMW tape.

These are the shapes (in green) you should have traced onto the paper side of the UHMW tape:

Diagram

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Cut the traced circles out using a pair of scissors. You should have two solid circles of UHMW tape with the paper still attached and one should be slightly larger than the other.

Take the larger circle of UHMW tape, remove the paper backing, and stick it to the solid flat side of the Small Throttle Axle Bearing Outside that you used to trace it. Do the same for the slightly smaller circle of UHMW tape and attach it to the solid flat circular side of the Arm Shell. Trim any excess tape off the edges of both parts so there isn’t any hanging off the edge of the parts.

Diagram

Description automatically generated

## Step 5. Add Leather Pads

The leather pads are added to the friction adjustment posts to reduce sticking when friction is increased. The leather will press up against the UHMW tape we added in step 4, allowing parts to rotate without stuttering or sticking, even when under extreme pressure.

Start by laying out a section of leather. Take your Main Throttle Post and place it against the leather, tapered and threaded side down so the solid circle in against the leather. While holding the Main Throttle Post in place, take a pencil and trace the shape of the circle making contact with the leather. Now do the same with the Side Throttle Post on the leather where it won’t overlap with the circle you traced for the Main Throttle Post.

These are the shapes you should have traced:

Shape, circle

Description automatically generated

Now, take a pair of scissors and cut out both circles that traced on the leather. Now, using superglue, attached the larger circle of leather to the flat round tapered side of the Side Throttle Post **with the rough side facing out**. Do the same with the smaller circle of leather and the Main Throttle Post.

Bubble chart

Description automatically generated with low confidence

Allow the super glue time to cure and then trim any excess leather hanging off the edge of both parts.

## Step 6. Add Magnets to Friction Grips.

WARNING: Handle these magnets with extreme care. Real N52 magnets, even of this small size, can be VERY dangerous. They will pinch, bruise, or even rip flesh if you get some between two of these small magnets. Handle with caution. Store far away from metal and leave wrapped in their bubble wrap sleave until you are ready to install them in the throttle.

These magnets will hold the friction grips in place so your preferred friction will be locked in while you game.

Take both your Side Throttle Fric Grip and your Main Throttle Fric Grip parts and place them on your work bench, side by side, with the four holes facing up. These two parts are identical so don’t worry about getting them mixed up.

Diagram

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Have your eight N52, 1/8 inch x 1/8 inch, Cylinder magnets out and near-by. Separate them, if possible, just to make it easier to place them quickly. Also, have your superglue out and open and a screwdriver with a small head nearby to press the magnet in place with.

Place as small a droplet of superglue as you can into one of the four upward facing holes on one of your printed Friction Grip parts. Immediately place one of your magnets in the hole. Direction doesn’t matter. Use your small headed screwdriver to push the magnet into the printed Friction Grip part until it is flush against the top of the part.

Diagram

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Diagram

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**Do this for each hole on both Friction Grips until all eight magnets are in place and then set them aside while the superglue cures.**

Diagram

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## Step 7. Add Ferrous Steel Wire to Box Bottom Shell

Okay, so this is the fiddliest part of the entire build. We need to add ferrous steel wire Box Bottom Shell so the Friction Grips get held in place. I haven’t figured out how to do this well other than trial and error and some additional prep work.

Start by taking your printed Box Bottom Shell and some rough sandpaper or a thin metal file. There are large threaded holes for the Friction Grip Posts to thread into on the back left and back right of the Box Bottom Shell. Sand down and rough up the flat and curved surfaces encircling the large threaded holes on both sides (tinted green below).

Diagram

Description automatically generated with medium confidence

Now, bend the ferrous steel wire so that it can fit inside this marked area. I found it easiest to bend the wire so it fits in half the circle, cut the wire, and then bend it further with two pairs of pliers but I suspect there is a better way. I ended up creating two half circles of wire for each section.

Then, place the wires into the groove around each opening and make sure it’s flush with the outside of the box. If it’s not, file and sand the groove more.

When the wire lays flush with the surface of the box with lines cut out around it, put a generous amount of superglue into this groove where a piece of wire will go and then place the wire.

Wait for glue to cure between each piece of wire.

Do this until wire circles the rim of each threaded opening, something like this.

Diagram

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Again, it doesn’t have to be in two parts like this. You could circle the threaded hole with four pieces of wire or just one but I had the most luck with this.

Once wire is in place, your printed parts are ready to be assembled.