

3D Printing Instructions for SleepyLoRa Plantation Shutter Actuator

Comprehensive Guidelines for Printing and Cleaning

Overview

The SleepyLoRa plantation shutter actuator is designed to be easy to print and assemble. Over a dozen prototypes have led to this design, with just enough space to fit the necessary components and to tidy excess cable inside. This guide provides step-by-step instructions for 3D printing its parts, using the recommended resin type, ensuring proper cleaning and safety practices. The files for this project are hosted on GitHub here

https://github.com/Hootie81/SleepyLoRa/tree/main/3d_prints

STL's for all the parts are available, and pre-supported files for Chitubox, in an array of 6 for the large pieces, and an array of 4 for the smaller parts. There is a left and right variation of the actuator arm



Required Materials and Equipment

- Resin: Siraya Tech Fast Mecha White – This resin has been tested and proven to possess the optimal properties for the actuator's tight tolerances.

<https://siraya.tech/products/siraya-tech-fast-abs-like-wear-resistant-resin?variant=41963498504301>

- Alternative resin for internals – Siraya Tech Build Sonic Grey, perfect low shrinkage and non-brittle for the internal components. And its much cheaper than the mecha white. Shame its not white! <https://siraya.tech/products/build-resin-drillable-precision-printing?variant=40152208212077>



- 3D Printer: Ensure your printer has a build height of at least 190mm for the large parts, the small parts will fit on most printers. I use an Anycubic Photon mono for the internals and a Creality Halot Mage for the large parts.
- Heater for printer if printing below 25°C, as the tall print takes over 20hours to print I highly recommend spending the money, I found the parts get thicker when its cold and don't fit <https://www.aliexpress.com/item/1005006860975250.html>
- Cleaning Supplies:
 - Isopropyl alcohol (IPA) or resin cleaner
 - Three containers for the rinse process
 - Air compressor or high-power blower
 - Nitrile gloves
 - Paper towels or lint-free cloths



Safety Instructions

- Protective Equipment:
 - Safety goggles,
 - nitrile gloves
 - well-ventilated workspace or a respirator if necessary.
 - Ensure a bin is nearby for putting waste resin/build supports, dirty rags etc.

Resin can make a mess, I print in the carport for ventilation and in case I make mistakes. I have had resin vats fail and leak everywhere. Always wear eye protection, parts snap easily and resin has a magnetic attraction to your eyes, especially when removing supports and cleaning.

3D Printing Instructions

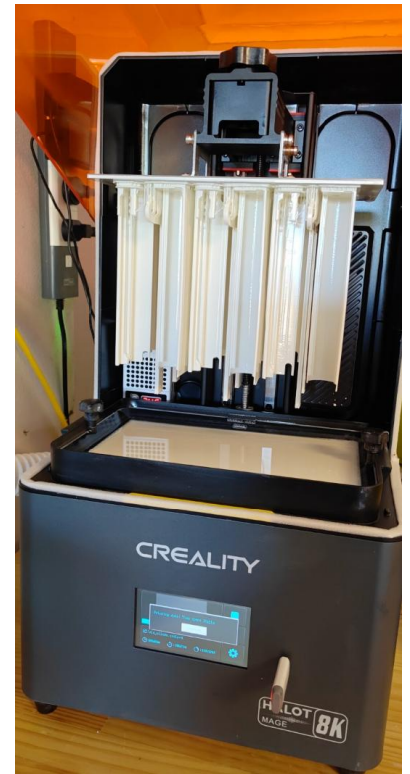
Step 1: File Setup

1. Download the STL files from the GitHub repository https://github.com/Hootie81/SleepyLoRa/tree/main/3d_prints and import them into your preferred slicing software. I prefer Chitubox pro, the extra features have been useful

2. Configure the slicing settings for the Sirayatech Fast Mecha White resin. Recommended settings include:

- Layer height: 50 microns
- Exposure time: 1.7s
- Tolerance Compensation: a: -0.070 b: -0.070
- Supports: Add sufficient supports, particularly for overhangs. Think about pulling force directions when the print is lifting, ensure there is support directly below where its pulling from otherwise the part will end up like a banana. I use light support and lots of it.

3. Ensure the model's orientation minimizes the need for excessive supports and allows for proper drainage. For the long parts I print them completely vertical, this minimises warping.



Step 2: Printer Preparation

1. Ensure your 3D printer has been levelled as per the manufacturer's instructions.

2. Thoroughly mix and pour the Siraya tech Fast Mecha White resin into the printer's vat.

3. Turn on the heater, I run mine at 30°C

3. Perform test prints to ensure the exposure time and tolerance compensation are set correctly. With Mecha White I found a resin exposure of 1.7sec and a tolerance compensation of -0.07 for both internal and external surfaces gave me best results. I use the same settings on the Anycubic Photon Mono and Halot Mage. The settings on the Siraya Tech website don't give good results

4. Double check the bottom of your resin vat for any lumps!

Step 3: Printing

1. Start the 3D printing process.

2. Monitor the initial layers to ensure proper adhesion to the build platform.

3. Wait the 20 odd hours to print

Post-Processing and Cleaning

Safety Precautions

1. Always wear nitrile gloves and safety goggles when handling uncured resin.
2. Work in a well-ventilated area to avoid inhaling fumes.
3. Avoid direct skin contact with resin and clean any spills immediately.

Cleaning the Printed Parts

The cleaning process is critical for ensuring the actuator parts achieve the necessary tolerances and functionality. Follow these steps meticulously:

Note: don't perform trial fit until after the curing process is complete, trust me!

Step 1: Separate parts from support material

1. Separate the support material from the parts. Most parts can be removed while on the build plate. A small mason jar or a tea strainer will be useful for the gears and small parts. Don't waste alcohol cleaning up the support material, remove the parts and put the support material in the sun for a few hours to cure and bin it.



Step 1: Initial Rinse

1. In small batches submerge the printed parts in the first container filled with isopropyl alcohol (IPA) or resin cleaner.
2. Gently agitate the part for approximately 30 seconds to remove excess resin.

Step 2: Second Rinse

1. Transfer the part to a second container filled with clean IPA.
2. Repeat the agitation process for another 2-3 minutes to further remove resin residues.

Step 3: Final Rinse

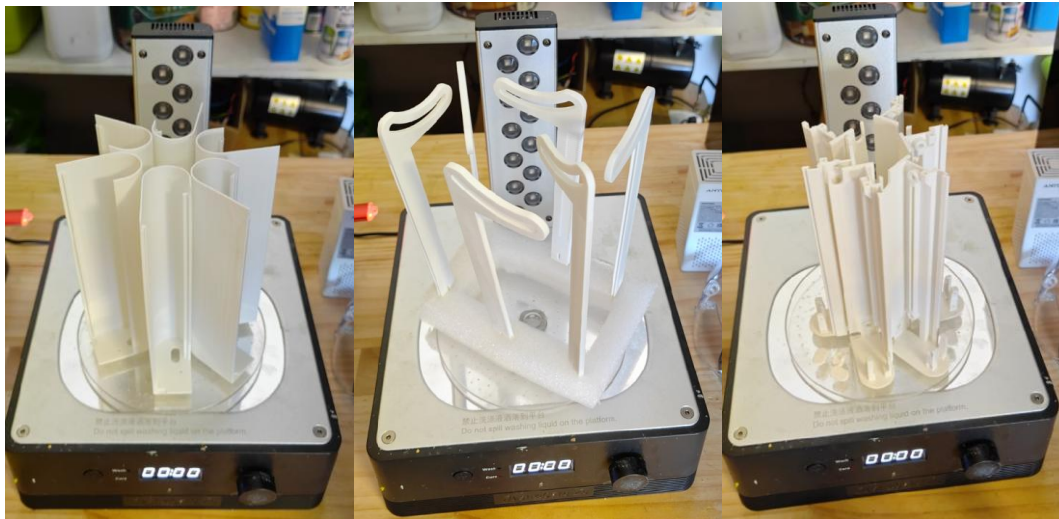
1. Move the part to a third container with fresh IPA for the final cleaning step.
2. Agitate the part again for 2-3 minutes to ensure all traces of resin are removed.

Step 4: Blow Dry

1. Use compressed air to thoroughly dry the part, paying particular attention to the profiles where the cover slides onto the base, the antenna slot and the actuator teeth, and gears. This step is crucial due to the actuator's tight tolerances. Leaving the alcohol to evaporate will leave residue on the part.
2. Inspect all the gear profiles for support material, the supports are the exact size to fit in the gears they tend to stick really well in there.

Curing the Parts

1. Place the cleaned parts in a UV curing chamber or under a UV lamp.
2. Follow the resin manufacturer's recommended curing times to achieve full mechanical properties. I typically do 6 minutes
3. a foam block with slots cut helps to cure the long actuator arms.



Assembly and Testing

1. Once the parts are fully cured, carefully inspect them for any defects or resin residues.
2. Use a 1mm drill bit to clean the holes in the small gears, file any remaining support material off, and ensure the inside of the cam profile is smooth.
2. Assemble the parts, how to video here https://youtu.be/qfTnw-1N8DM?si=aZ-7PTGw5bI3fyB_

