



# How to 3D Print molds for custom Stamps @ustreasury

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<https://learn.adafruit.com/how-to-3d-print-molds-for-custom-stamps>

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# Overview

In this week's project we'll take a look at making stamps using a 3d printed mold.

Inquires? email [legal@adafruit.com](mailto:legal@adafruit.com)

Usually a simple stamp design can work with plain PLA by orienting the design flat on the bed. However, more complex artwork will require making a silicone/rubber mold out of a 3d printed negative.

To get higher resolutions for complex artwork, we'll need to print our design vertically. Ink doesn't transfer well to printed parts when the layer lines are vertical, so we'll need to use casting putty to create our stamp molds.

Printing parts up right benefits from a (theoretical) resolution in the x-y-plane of 12.5 micrometer, which together with a layer height of about 0.15 mm will give you much more detail for the mold part.

To build the stamp design, we used a lithophane generator to create a 3d map of our design. It works by translating the black and white values into bumps that form the image of the design. We'll adjust the settings so we can invert the design to create the negative for making a putty mold. The putty is silicone base, so its able to transfer ink really well.





## Parts

To create the molds for the stamps, we'll only need a couple of parts and tools.

- Scale
- 3d printer (<https://adafru.it/vAo>)
- flush cutters (<https://adafru.it/dxQ>)
- play-doh
- Amazing mold putty (<https://adafru.it/zee>)

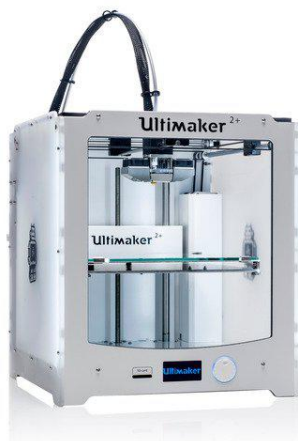


## Two part mold putty

This mixture is easy to use and cures in 15 minutes!

It has a mix ratio of 1:1 with a work time of 2-3 minutes. This means will need to measure how much putty we'll require for our part and then divide that number by two for each part of the putty mix.

After casting the "demold" time (cures) is about 20 minutes.



## Ultimaker 2+ 3D Printer

The Ultimaker 2+ is one of our favorite 3D printers on the market. It's a well-built open-source compact machine with an excellent UX. Every inch of the...

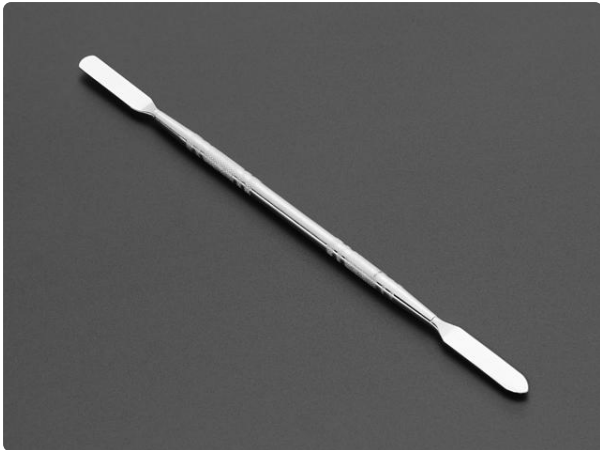
<https://www.adafruit.com/product/2673>



### Filament for 3D Printers in Various Colors and Types

Having a 3D printer without filament is sort of like having a regular printer without paper or ink. And while a lot of printers come with some filament there's a good chance...

<https://www.adafruit.com/product/2080>



### Spudger - Double Sided Prying Tool

Is there something missing from your tool kit or workstation? Are you having trouble figuring out which elusive tool it is that you're lacking? Perhaps it's a...

<https://www.adafruit.com/product/3434>



### Super Scissors

Save your scissors! Instead of using your nice shears (and dulling them) or wire cutters (not right for the job) - use these super scissors. They're meant for engineering/maker...

<https://www.adafruit.com/product/1599>

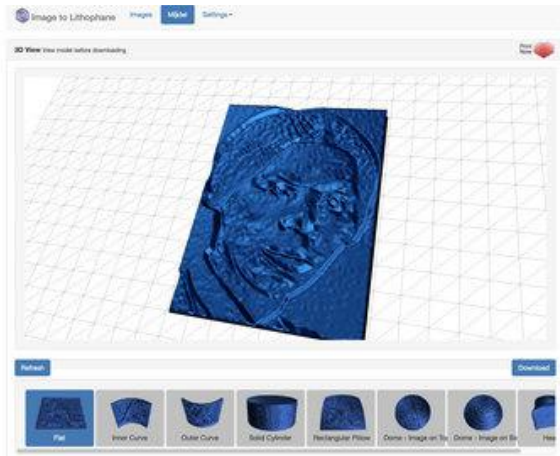


### Flush diagonal cutters

These are the best diagonal cutters, large super-comfortable grip to use and have strong nippers for perfect trimming of wires and leads. I've used my pair every day for years.

<https://www.adafruit.com/product/152>

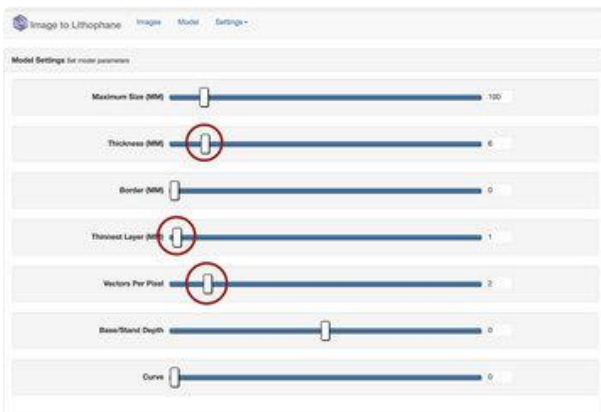
# Design the mold



## Converting the image into a 3d mold

We used the very handy website [3dp.rocks/lithophane \(https://adafru.it/zf8\)](https://adafru.it/zf8) to convert any gray scale image into the model we'll need for creating the putty molds. Before importing the we'll need to resize to image to fit the stamp size. Use an image editing program to properly scale the image. To scale an image to a dollar note, we measured the image to 35mm x 45mm.

Make sure to scale the image before creating the 3d model. You may loose details if you scale the 3d model afterwards.



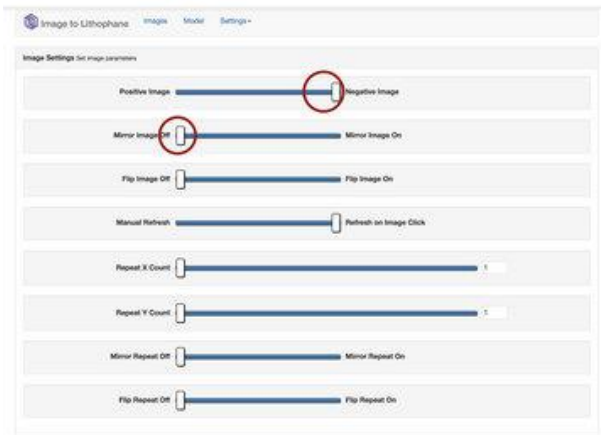
## Model settings

To create the negative parts for the mold, we'll need to edit some of the options in the model settings.

First change the thickness to 3mm

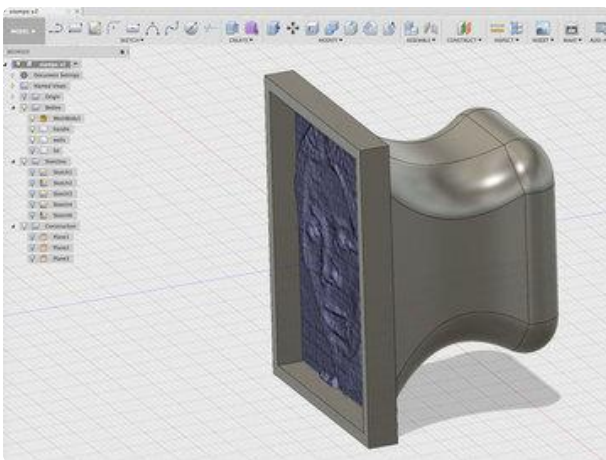
Set the thinnest layer to be 1mm

Change vectors per pixel to 2



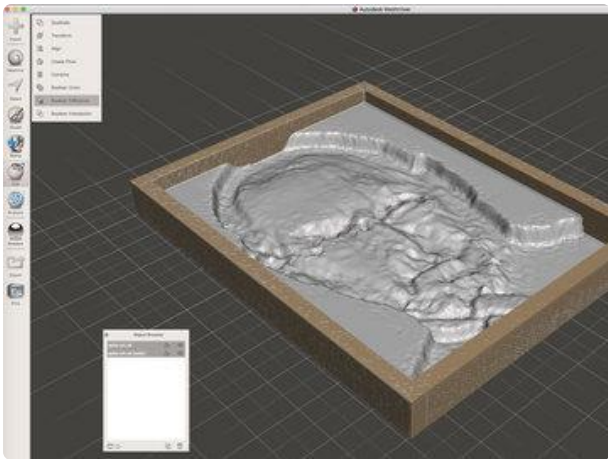
## Image settings

When making a stamp, keep in mind that the image must be reversed to have the correct orientation. You can adjust that in the image settings option if you forget to in your image editing program.



## Stamp Walls

Next will need to add walls for the putty to fill in our mold part. We built this simple wall design that you can easily edit to fit the dimensions of your stamp. The design also includes a handle to attach to the completed putty mold. You can edit the handle design measurements to match up to the stamp mold.



## Combine wall to design

After we size our walls to our mold part, we'll need to combine the geometry in to one solid object for printing. We used meshmixer to align and combine the mold and the walls objects.

Select the stamp mold and then shift select the wall geometry to invoke the boolean options. Select "boolean union" and then click on the accept button to finalize. Now we can import the solid model into our slicing program to create the tool paths for the 3d printer.

If the meshmix has errors creating a union between the two objects, we'll need to first select each object and then use the "make solid" option.

If you still get errors, we can use the combine option. First select stamp, shift select the walls and then click on the combine option. Now we can click on the "make solid" option.

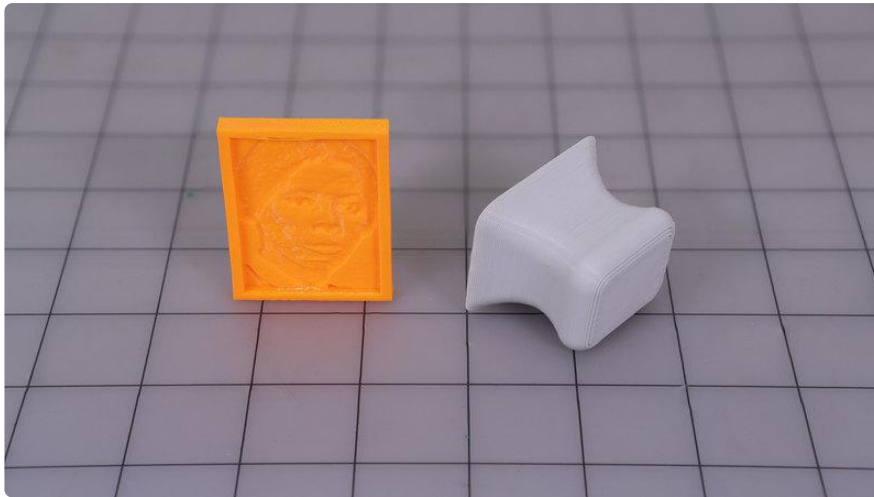
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## 3D Printing

The 3D printed parts are fairly easy to make with most common home desktop 3D printers that are on the market.

And if you don't have access a 3D printer, you can order our parts by visiting our Thingiverse page and have someone local 3D print the parts and ship them to you.





## 3D Files and Modifications

The parts were designed in Autodesk Fusion 360. If you're interested in modifying the parts, you can download the source file. If you're using different 3D modeling software, you can save it out as a STEP, IGS, OBJ and other file formats. The STLs can be downloaded "as is" from the repo sites listed below.

Download Fusion360 source

<https://adafru.it/zei>

Download from Thingiverse

<https://adafru.it/zej>

Download from Youmagine

<https://adafru.it/svF>

Download from Pinshape

<https://adafru.it/svF>

## Slice Settings

Download the STL file and import it into your 3D printing slicing software. You'll need to adjust your settings accordingly if you're using material different than PLA.

- 220C Extruder Temp
- No heated bed (65C for heated)
- 90% Extrusion Multiplier

- .4mm Nozzle
- 0.4 Extrusion Width
- .15mm Layer Height
- 100% infill
- No Supports
- 4mm skirt (brim)



## Printing on the edge

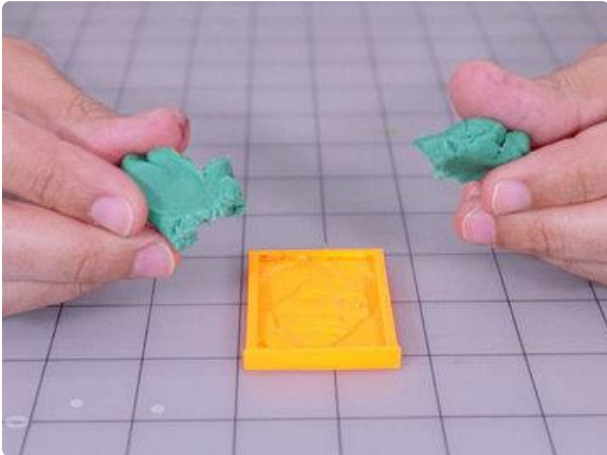
To achieve the highest quality possible, we'll need to orientate the mold so it prints on the flat edge of the wall.

Printers have a much higher resolution on the x and y axis than z.

To adhere the edges to the printing bed, we'll need to add 4 skirts outlines (2mm brim) to the bottom of the part. This will ensure parts properly attach to the bed while printing.

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## Build the mold



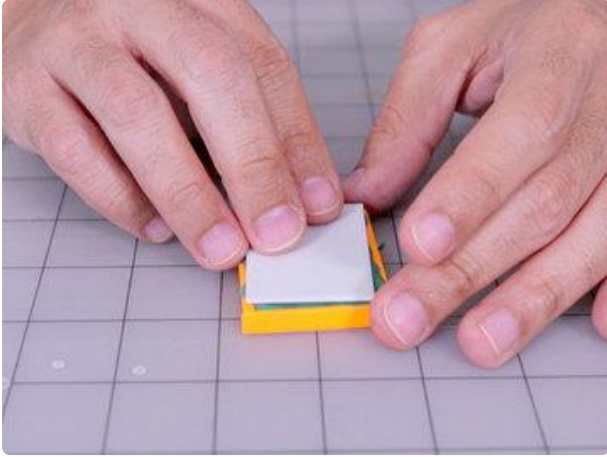
### Gauge weigh with doh

Before mixing our putty, we'll first test the required amount of material we'll need to fill our part with a couple pieces of play-doh.

Press the doh into all of the voids in the design. Use your thumb to help press the doh into all of the corners.



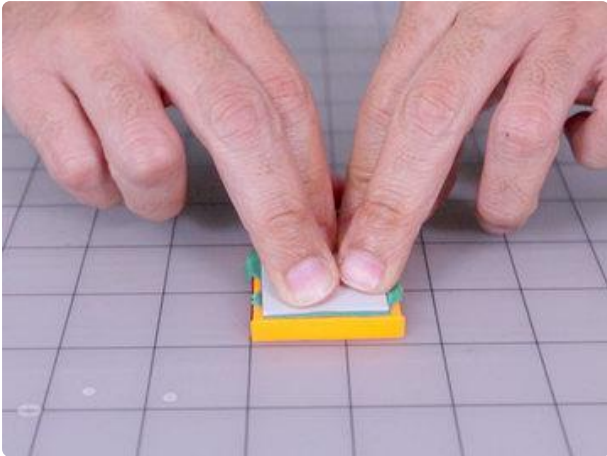
Apply pressure to the part with your palms and remove any excess that doesn't fit inside to the part.



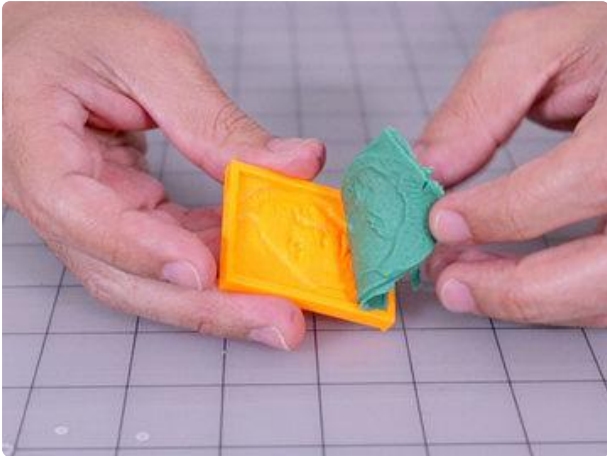
## Lid Press

Use the 3d printed lid part to further help press doh in all of the available spaces in the negative.

Start by using your thumbs to press on the center of the lid and then continue pressing in an outward pattern.



Make sure the back of the mold is even and above the four walls on the stamp. We'll need an even back to adhere to the printed handle.



## Weigh doh example

Now we can use the weight of the doh to measure the two part putty mixture for the mold.

To weight the doh, we used a general mailing scale for envelopes. Set the units to grams and make sure to measure on a level surface. Apply the doh on top to determine how much of the putty mixture we'll need.



Take several readings when measuring to make sure you have a correct reading.



## Measure putty

Use the weight of the doh to measure a 1:1 mix ratio.

Our stamp weighed in at 8g, so we'll measure two 4g parts



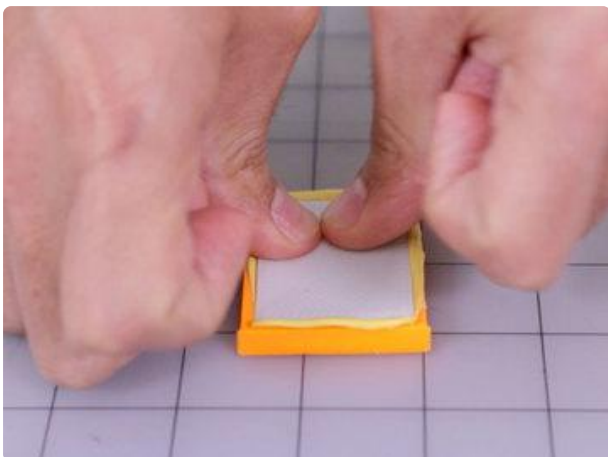
Quickly add or remove putty and measure as needed.



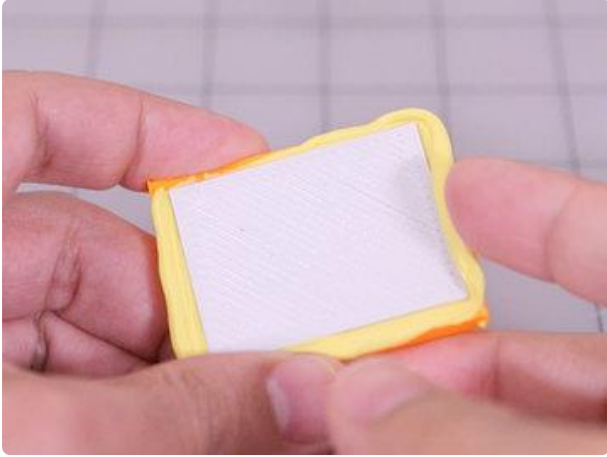
## Apply to negative

We'll have a 3 minute work time to mix the putty. Quickly and evenly mix both parts into a ball and then press the putty inside your mold part.

Use your thumbs to work the putty into all of the details and corners of the mold.



Reuse the lid to help compress the putty into the part. Just make sure to remove any doh from the previous use.



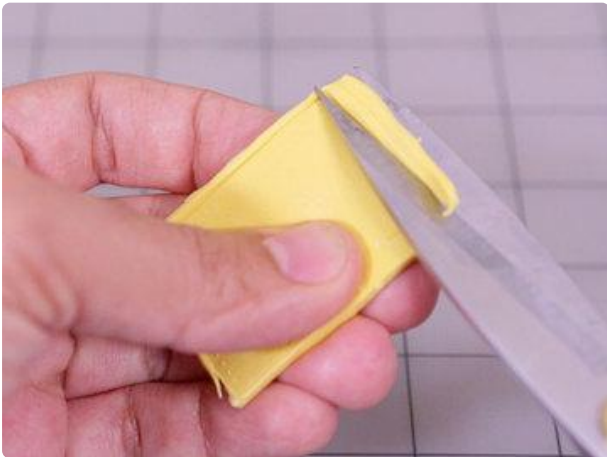
## Curing the putty

The putty will need about 20 minutes to fully cure. You can check on the process by feeling the excess putty on the sides of the mold. Press on the edges with your fingernail to see if the putty has turned into a solid piece.



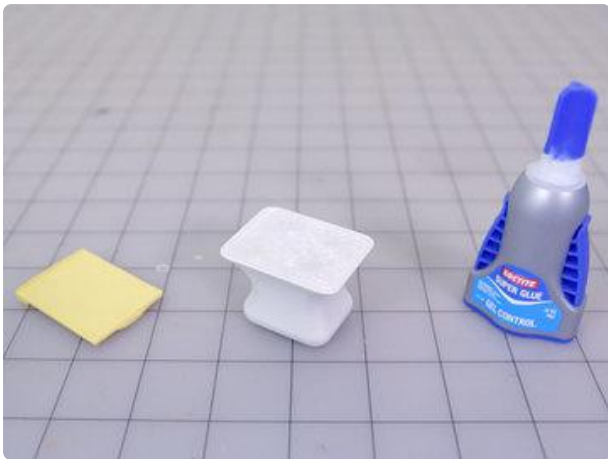
## Peel off mold

If the putty feels fully cured, we can go ahead and peel the mold off the part. Carefully pick the mold off the negative by lifting one of the corners. Choose a corner that can pull the whole mold off the part without ripping the whole mold. If you pick at a corner and it starts to rip, allow it to cure a little while longer and then choose a different corner to peel.



## Remove excess

Cut off all the excess on the mold with a pair of sharp scissors. Try to keep a straight angle to have an even back surface to attach to the 3d print handle.



## Adhere stamp to handle

Now we can glue the stamp to our printed handle. We ended up using a gel super glue to adhere the stamp to the printed handle.

Both E600 and hot glue didn't allow the stamp to adhere.

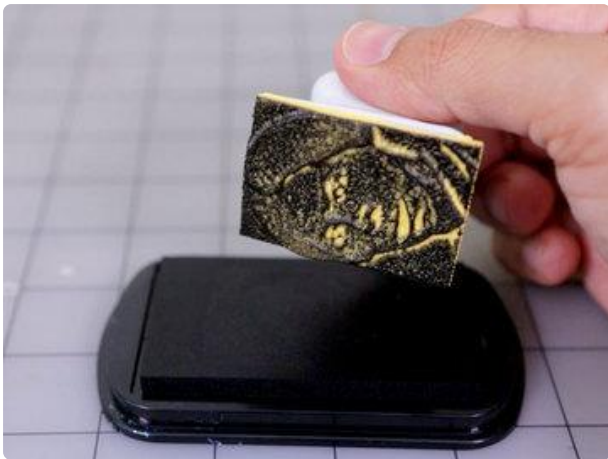


Apply small drops of glue to each corner, on the flat side of the handle. Apply even drops to the center and then press the mold to adhere it to the handle.



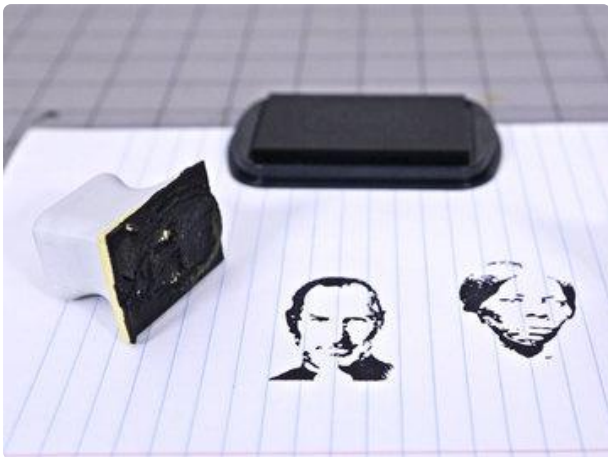
We'll want to make sure to apply even pressure to all sides of the mold. Allow to glue to cure for about 15 mins before use.





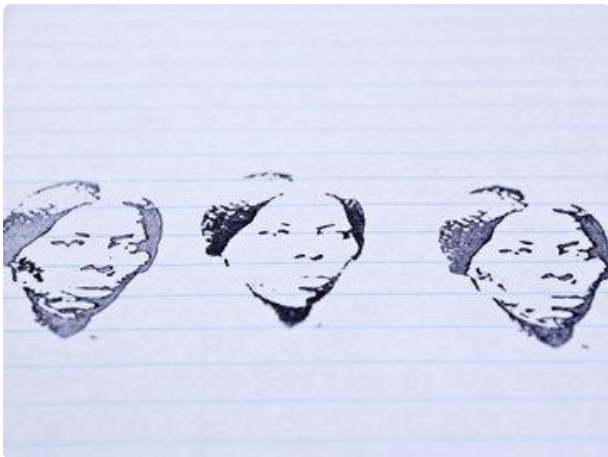
## Ink

Test the stamp with an ink pad bigger than the size of the stamp. We'll want all of the edges of the stamp to fit with in the ink pad.



## Test pressure and ink

To achieve the best quality, we'll need to test the amount of pressure used when stamping our design. The amount of ink will also effect the quality of the imprint.



For example, the second picture shows that a harder pressure with less ink achieves the most detail for this design. The picture on top show more ink with a lighter pressure resolves more detail for the steve jobs stamp.