

Instruction for making Logic Gate

Git repo: <https://github.com/Lehong-Wang/Fluid-Circuit-Generator>

Prepare prints:

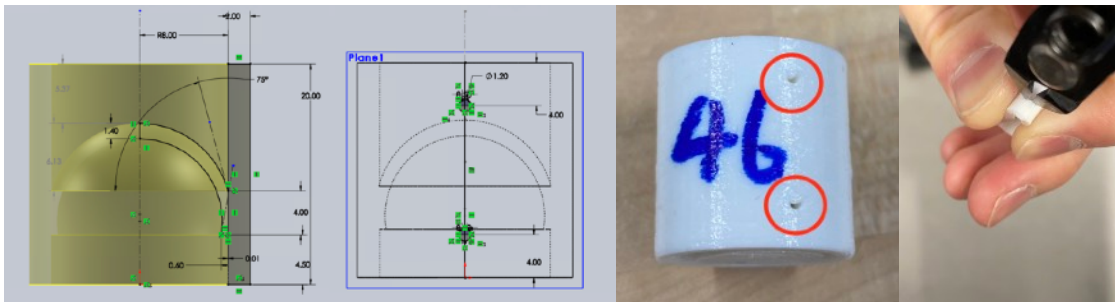
Mono valve:

print: 46_val_test_memb_r8_h4.5_20_mt1.4_0.6_ma75_rt4_rw0_hs1.2_smoothten.STL

setting: config_60A_Filaflex_infill_rim_with_support.ini

gcode:

46_val_test_memb_r8_h4.5_20_mt1.4_0.6_ma75_rt4_rw0_hs1.2_smoothten_0.1mm_filaflex_infill_rim_sup_6h26m_6.gcode



Circled is overhang

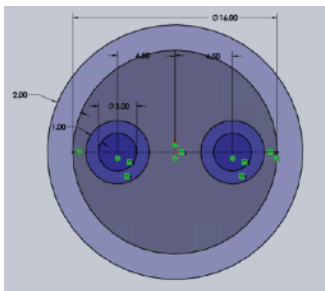
fold valve and cut them with plier if possible

remove support completely

print: straight_hole_cap_small_hl9_hd3_r8_10.STL

setting: config_Ninjabflex_improved_mini.ini

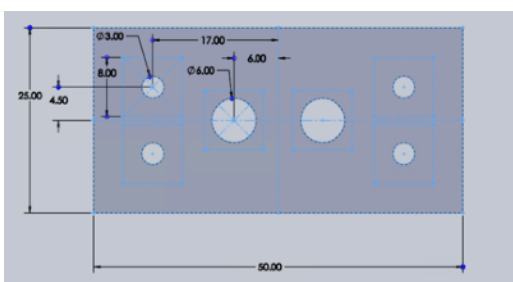
gcode: straight_hole_cap_small_hl9_hd3_r8_10_nijiaflex_12.gcode



print: val hoder mono 8_3_6.STL

setting: config_Ninjabflex_faster_mini.ini

gcode: val hoder mono 8_3_6_0.2mm_nijiaflex_faster_6.gcode



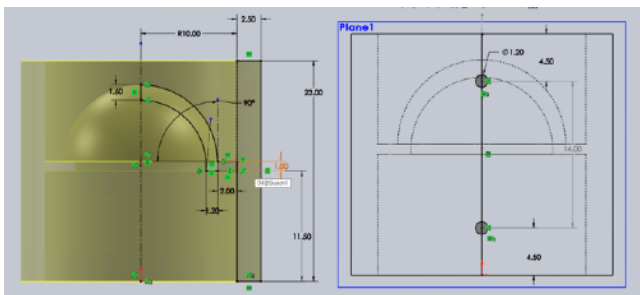
Bi valve:

print: 68_val_test_memb_r10_h11.5_23_mt1.6_1.2_ma90_rt1_rw2_hs1.2_hd14.STL

setting: config_60A_Filaflex_infill_rim_with_support.ini

gcode:

68_val_test_memb_r10_h11.5_23_mt1.6_1.2_ma90_rt1_rw2_hs1.2_hd14_0.1mm_filaflex_infill_rim_sup_10h58m_6.gcode

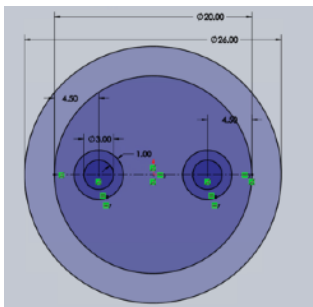


Same treatment as above

print: straight_hole_cap_thinner.stl

setting: config_Ninjabflex_improved_mini.ini

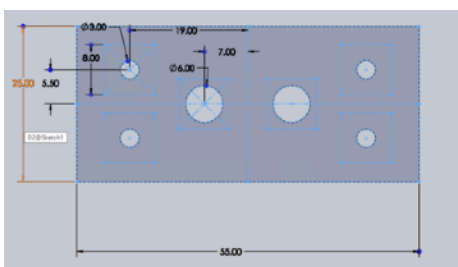
gcode: straight_hole_cap_thinner_0.2mm_nijaflex_improved_mini_9.gcode



print: val hoder bi 8_3_6.STL

setting: config_Ninjabflex_faster_mini.ini

gcode: val hoder bi 8_3_6_0.2mm_nijaflex_mini_faster_6.gcode



Tube:

Extrude with MINI3

temperature: 235
full fan speed
speed: 150

Use “ Pronterface ” to control printer
Try NOT to use printer menu, the way it sends commands makes it hard to extrude tube

Send these Gcodes in sequence every time connect to printer
Commands in brackets are recommended, but not necessary
Gcode:

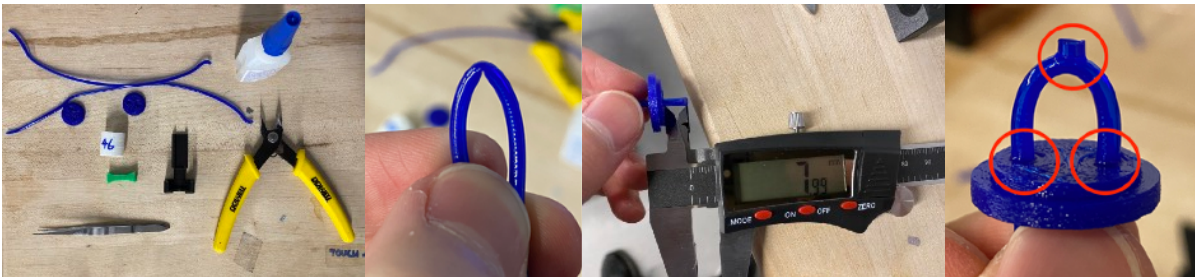
G91	# relative positioning
(G0 z10)	# test if relative positioning work
M83	# relative extruder positioning
M106 S255	# full fan speed
M104 S235	# temperature to 235
	# wait for temperature to reach 235
g0 f150 e1000	# extrude 1000 mm of filament with speed of 150 (unit unsure)
	# 1000 is the max length that can be sent one time

remember to adjust temperature setting once a while, else printer will disable heating after 30 min

If heating was turned of accidentally, check if filament is stuck in extruder gear (which happens if filament is forced to extrude)

Assembly:

Mono:



remember to check for weak side of tube and put the reverse side inwards (to not easily kink)

Top: 11mm + 1mm spacer

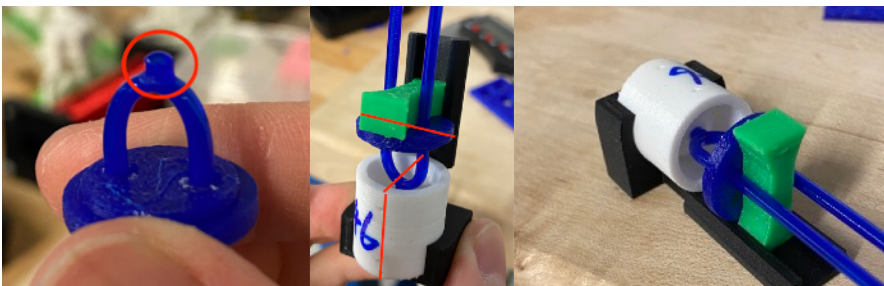
Bottom: 8mm

before sticking, soften tube by crushing it in different directions (kink every single part of tube, thus tube is less prone to kink by itself)

apply glue to bottom of tube, and stick spacer

write down length of tube at the bottom of cap (write “8” or “11+1”)

When glue is dried, start assemble cap to body



apply half a drop / a drop of glue to top of spacer

with help of the printed tool, slightly press the spacer at the center of membrane

IMPORTANT:

Make sure that the tube is perfectly perpendicular to the holes on membrane body
This will greatly affect latter assembly steps

When glue dries, start to glue both caps to body

IMPORTANT:

make sure to protect your hands with gloves in this step

put lots of glue around the cap, and push the cap inside body
glue should overflow, and it will help seal the parts
clammer is needed in this step to hold the three parts together

Start with the cap without forces from membrane, which is bottom cap
this way it's easier

It's fine to destroy some gloves at this point

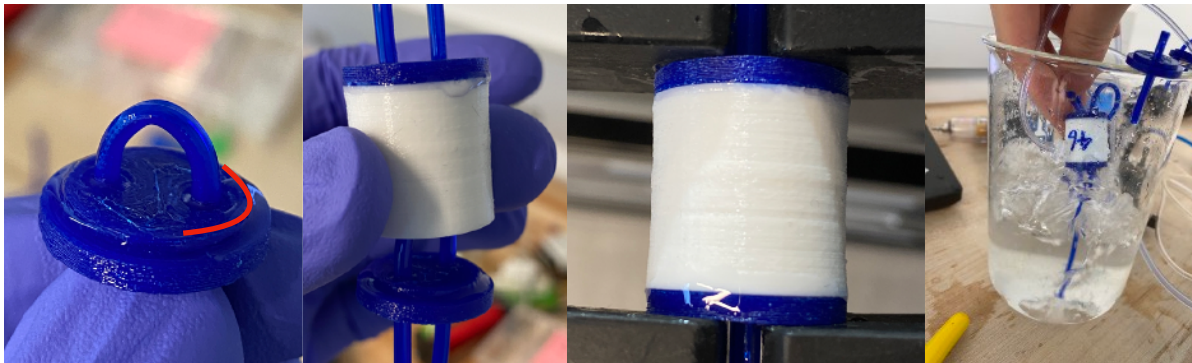
For better glueing, better to apply some glue to top parameter of the cap (marked in red in pic 1)
This will make cap stick to body from the inside.

Also, don't apply too much pressure when sticking them apart.
Having a lot of glue between cap and body makes a very robust seal.

NOTE:

This is the final chance to fix non-perpendicular problem
make sure to make it perpendicular

it's encouraged to apply more glue to ensure air-tightness



do not squeeze too tight with clap, thick glue between cap and body make it harder to pop

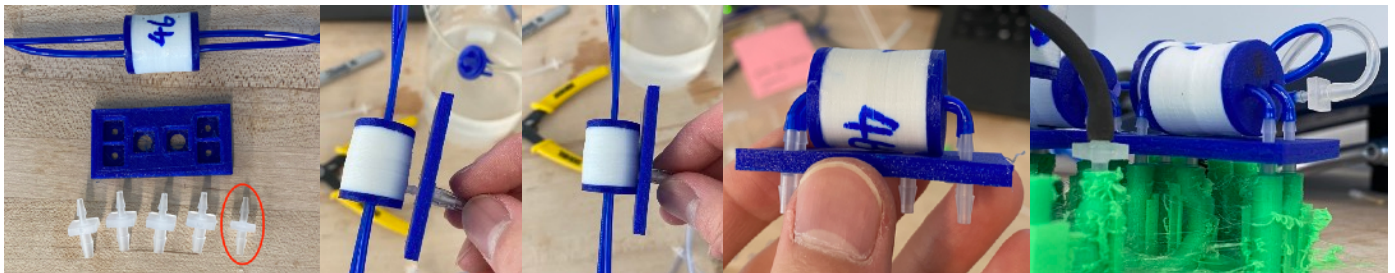
After all glue dried thoroughly, test for air-tightness, flow, kink.

The demo valve can actuate at 105 kPa, with great air flow.

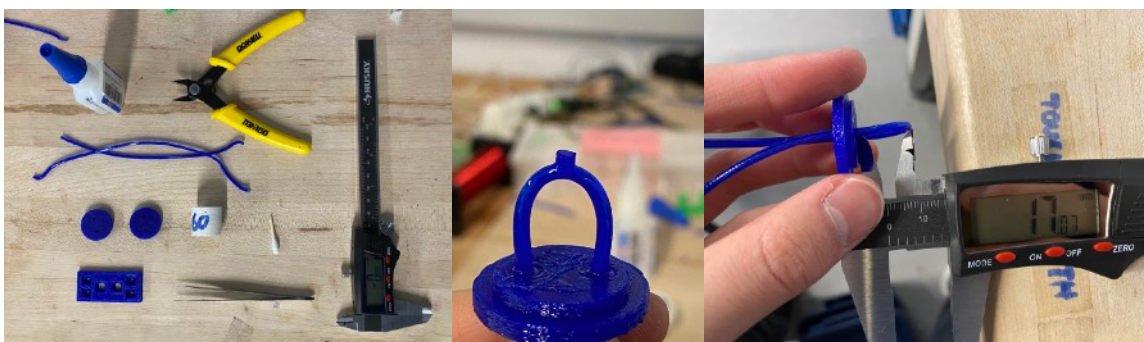
Final step is to put the valve onto a holder.

Need exactly the connector on the right. Small end is for tube, large end is for printed circuit. Body can be fitted into by applying pressure, which make the body stiff, and then do skew like motion to skew connector into body.

cut tube to 9 mm length, which will fit like in the picture below
last picture shows how the unit fit on the circuit
The holes should line up, and just need a little force to push the unit in



Bi:



NOTE:

the membrane body used should be version 68, not 60 as shown in picture

same steps as mono

Top: 17mm + 1mm spacer

Bottom: 9.5 mm

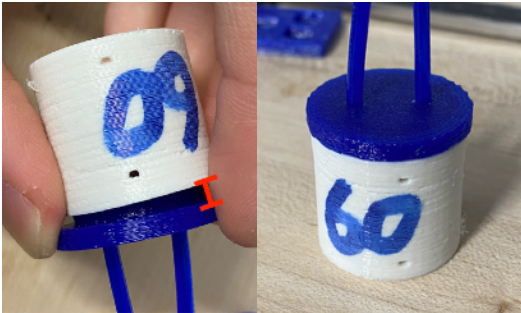
When glue is dried, start assemble cap to body

flip down the membrane, a drop of glue on spacer, and carefully put the top cap inside body

IMPORTANT:

Make sure that the spacer is at center of membrane
tube is perfectly perpendicular to the holes on membrane body

if everything is done correctly, there will be about 2mm gap between cap and body, just enough to
apply glue later
you should be able to gently squeeze the cap into body. Carefully push around to fit cap inside.



DO NOT flip membrane back at this point

when glue solidifies, start to stick both caps to body

start with top cap, **DO NOT** unflip membrane
push bottom cap inside

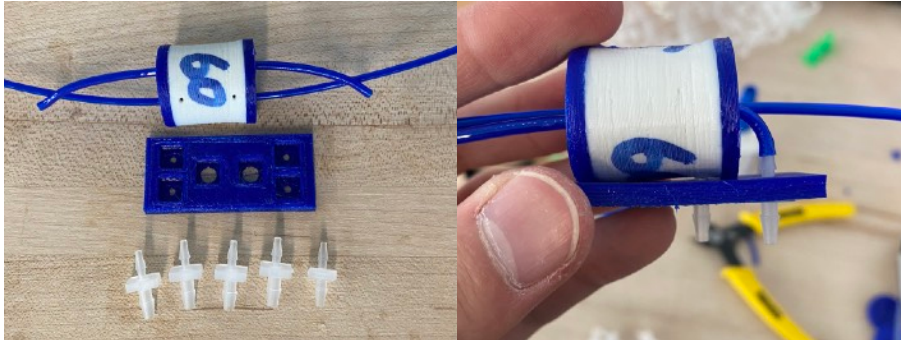


IMPORTANT IMPORTANT IMPORTANT :

Flip membrane up as soon as glue is dried.
The longer the bottom tube get kinked, the less air flow it will have. And it's hard to recover !!
DO THIS AS SOON AS POSSIBLE

the example valve was kinked for about 2 hours, and already have significantly less air flow than expected.

The example valve can actuate at 90 kPa



Same as Mono

cut tube to 12mm, should fit

Pixel:

3D model:

Bi stable val screen v2_2.STL

screen_slit_v2.stl

screen_cap.stl

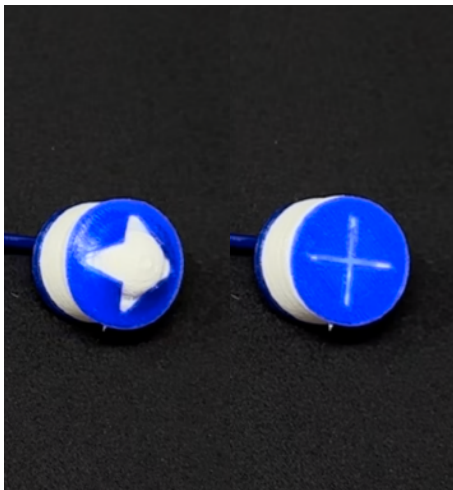
(body, filaflex)

(top cover, nijiaflex)

(cap, nijiaflex)

Pixel displaying:

left: 1, right: 0



Circuit Design

Referee to the README file in git repo.

Try to avoid pull-down resistors
although do have resistor as a gate design

pull down resistor_spiral_r0.8_sl5.STL

not very high resistance

