3 CONSECUTIVE SERIAL DILUTIONS CHIP

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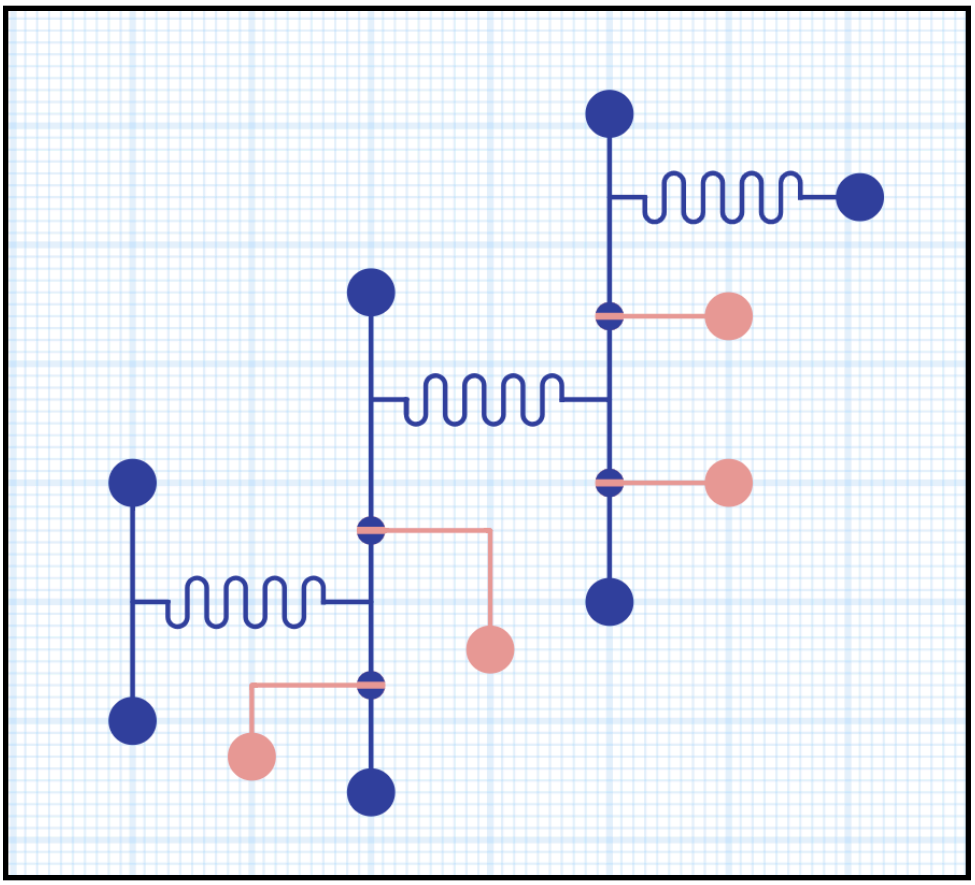
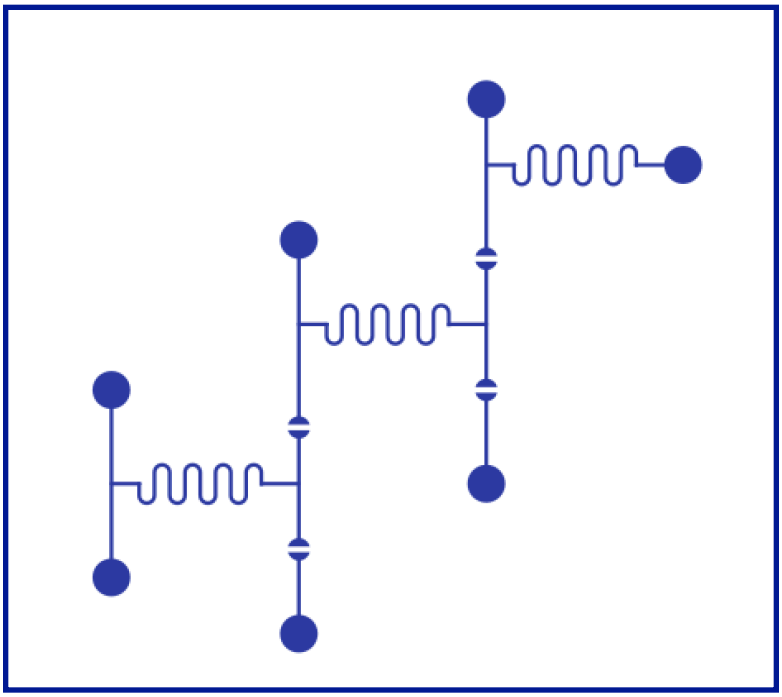
Overview

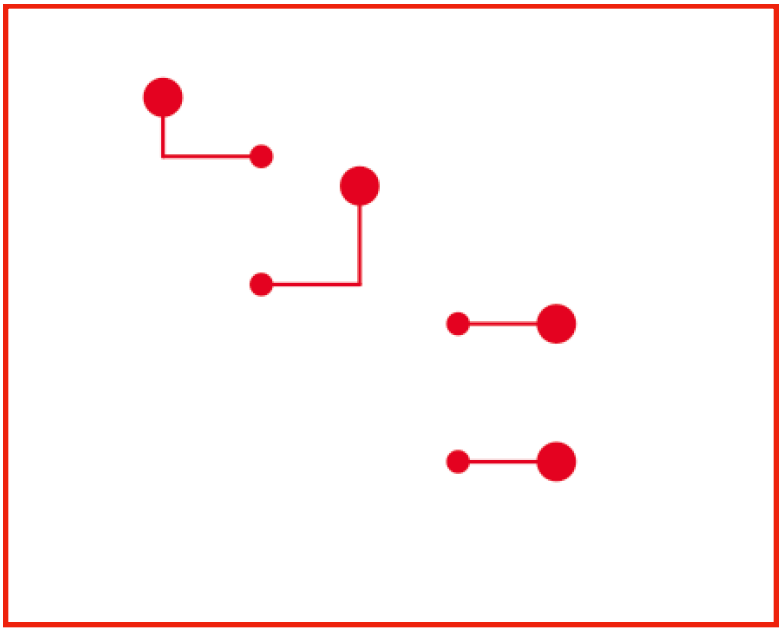


This chip was designed to run three consecutive serial dilutions. The two fluids meet and mix as they run through the mixer. The ratio of the dilution is controlled by the flow rates of each of the inputs. For example, a 1:20 dilution is achieved by inputting the water in at a flow rate that is 19 times greater than the flow rate of the sample. The valves are use to control whether that dilution is to be collected off chip, or is flowed onwards to be further diluted at the next mixer. This chip can run 3 consecutive serial dilutions, with possible collection occurring after each subsequent dilution.

Chip Design

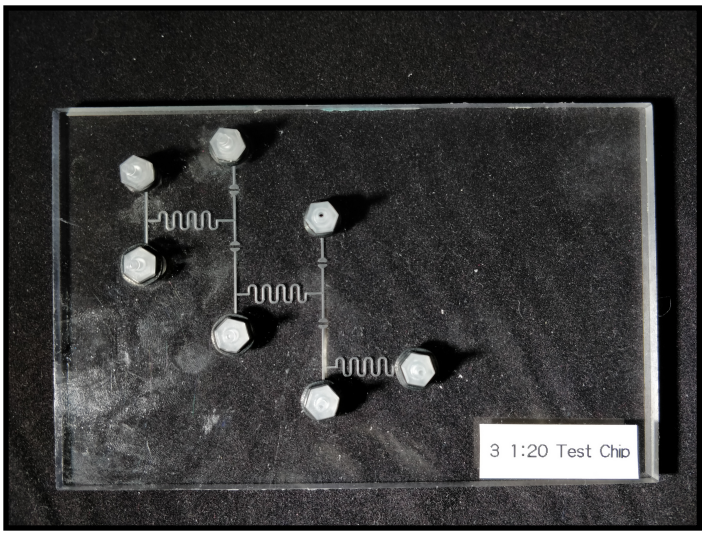


Flow Layer

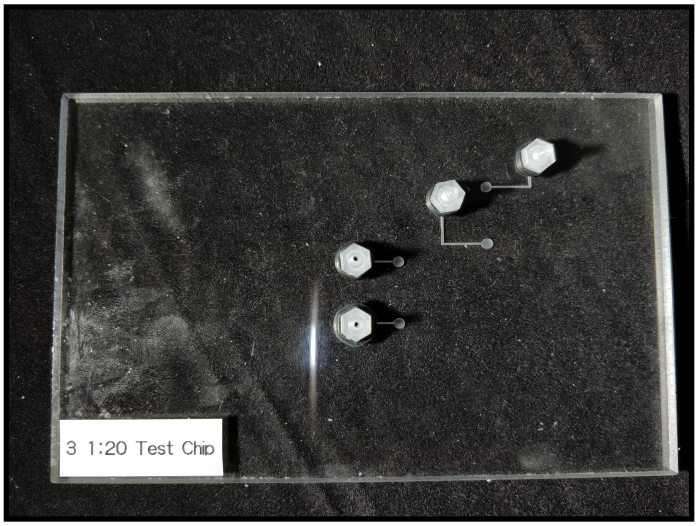


Control Layer

Milling Instructions



Flow Layer

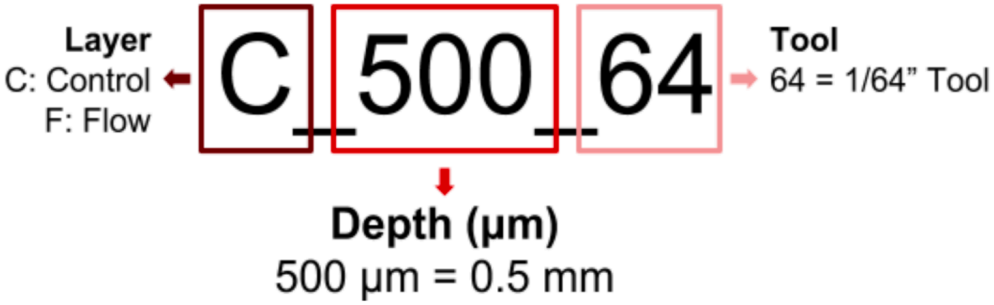


Control Layer

Notes:

- This chip should be milled on thick polycarbonate (5.00mm < $Z_{Polycarbonate}$)
- This chip should be used with thin PDMS (0.24mm < Z_{PDMS} < 0.26mm)

All the required SVGs for milling this chip are provided in the ZIP file. The layer, depth, and tool required for each SVG are listed in the file name. Below is the key describing how to read an SVG file name.



Milling Instructions

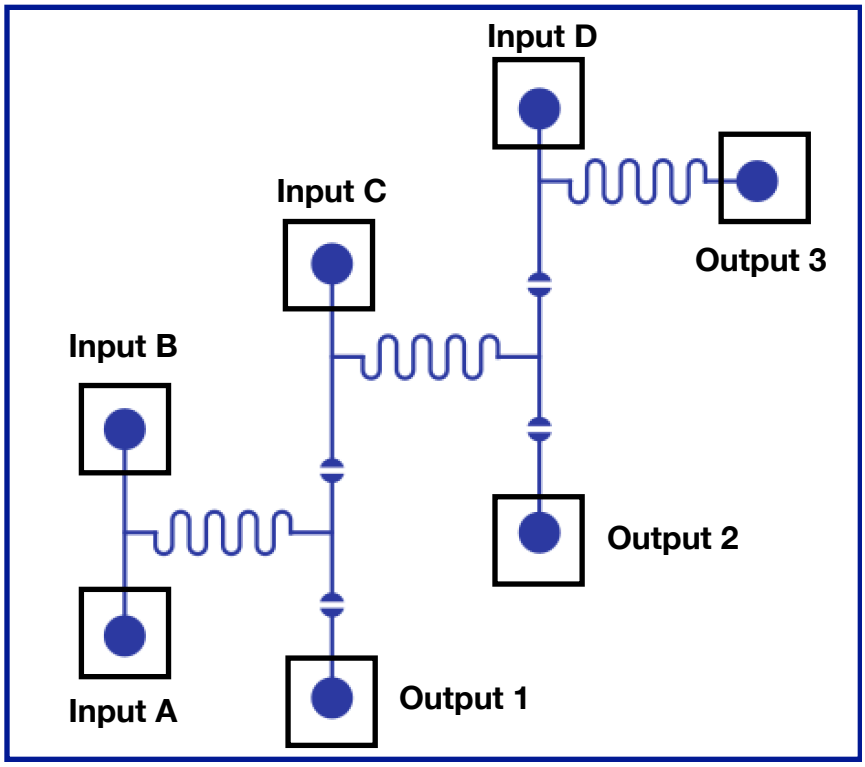
Mill the layers in the order they are listed with the correct depths and using the correct tool

Flow Layer	
Order	**Layer Name**
1	F_400_64
2	F_400_100
3	F_THRU_8
4	Border

Control Layer	
Order	**Layer Name**
1	C_400_64
2	C_THRU_8
3	Border

Testing Protocol

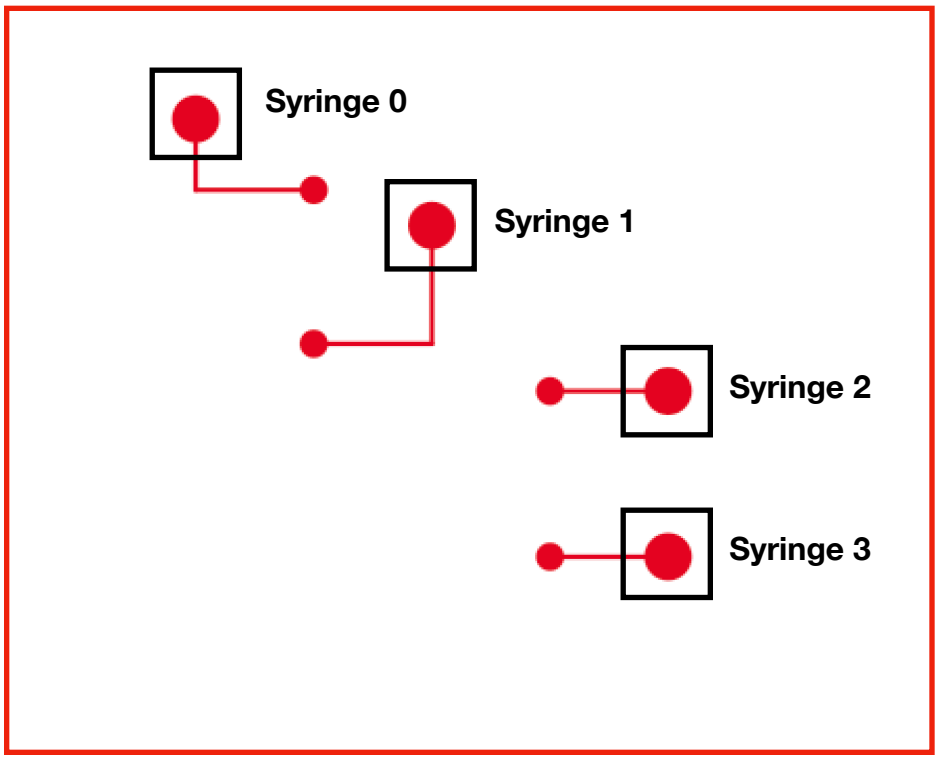
Flow Layer Set Up



Inputs		
Name	**Liquid**	**Flow Rates (for a 1:20 dilution)**
A	Sample	0.1 mL/hour
B	Water 1	1.9 mL/hour
C	Water 2	38 mL/hour
D	Water 3	760 mL/hour

Outputs	
Name	**Liquid**
1	1:20 Dilution
2	1:400 Dilution
3	1:8000 Dilution

Control Layer Set Up



Testing the Chip: Set Up and Protocol

1. Connect and attach all syringe and output tubings using the above diagrams
2. After setting all control syringe pumps to origin state and attach following the diagram
3. Open the syringe 1 and close the rest then turn on inputs A and B, sending the first 20 minutes of fluid to waste while stabilizing
4. Collect sample then close 1 and open syringes 0 and 3
5. Turn on input C and let run to waste for 5 minutes than collect sample
6. Close syringe 3 and open syringe 2
7. Turn on input D, let stabilize for a couple of minutes than collect sample

Cleaning the Chip

1. Carefully disconnect tubing and dispose of all liquid waste
2. Disconnect all syringes
3. Clean the chip following the MARS protocols
4. Store the chip following the MARS protocols