APP N04-1

Engineering 1282H

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Idea 1: Testing the Adhesion Time

- Testing the effect of adhesion time, keeping other variables constant
- 4 channels, yeast will be allowed to incubate for a specified period of time in each of the 4 channels before testing, all channels will be straight, equal length lines of equal depth to ensure no differences in data
- Each channel will have one entrance and exit port, no conceivable benefit for multiple
- Channels will be 300 micrometers deep and 300 micrometers wide, and 2 cm long
- The testing region will be the middle 1 cm of each channel, and will be marked on the chip
- The entrance and exit ports for the water flow will be circular to match the shape of the tube we will use for testing that was shown to us previously
- The chip itself will be a square as will the chip holders, and all the parts will be the same size with aligned holes in the corners in order for the chip holder to consistently hold the chip in the exact same position and to ensure easy alignment
- One of the main design considerations is what variable we want to test for, as this may determine the chip we want to use as certain chips may be better suited for certain variables
- This chip could be used for some other variables
- The ease of use of the chip and chip holder as well as consistency of the chip and chip holder should also be taken into consideration as the experiment must be repeatable in the exact same conditions

Idea 2: Testing the Shear Force/Water Pressure

- Testing the effect of water pressure/shear force on cell adhesion
- All other variables will remain constant
- 5 channels, One channel will be 250 micrometers deep and 300 micrometers wide, one will be 250 micrometers deep and 350 micrometers wide, one will be 300 micrometers deep and 350 micrometers wide, one will be 300 micrometers deep and 400 micrometers wide, and the final will be 350 micrometers deep and 400 micrometers wide, all will be 2 cm long
- The different channel sizes will lead to water flowing through at different pressures, generating different amounts of shear force
- The entrance and exit ports for the water flow will be circular
- The testing area will be the middle 0.5 cm and will be marked on the chip for each channel
- The channels will all be straight lines
- The chip and chip holder will be squares with a hole in each corner to easily fasten the chip into the chip holder
- This chip could only be used for testing on various pressures, as if you were to test for anything else the pressure would not be controlled
- Chip and chip holder have similar ease of use as the previous chip

Idea 3: Testing channel shape impact

- The fluid should flow faster around the outside of the curved channels, will see how the curved channels compare to the straight channels, as in many applications the “channels” will not be perfectly straight
- 2 straight channels, 2 curved channels, all about 2 cm long and 400 micrometers deep
- Testing area will be the middle 0.5 cm of the straight channels and the peak of the curved channels, will be marked on the chip visually
- Will test how the curvature of the channel affects the cell adhesion in comparison to the straight channels
- Square entrance and exit ports to match the rectangular shape of the channels
- Circular chip shape, triangle chip holder
- Chip holder will have 3 holes, one in each corner, which will hold the circular chip in place while not having to go through the chip
- This chip could only be used for testing this variable, could not be used for other tests
- Different chip and chip holder shape than the other two options, which should be taken into consideration

Drawing of Idea 1, right view of chip holders not include as it is not necessary.