96 Channel Pump

Brian Butler, Rodolfo Garcia, Tanner Hatch, Bryan Luke
Project Advisor: Dr. Bruce Gale; Project Sponsor: Wasatch Microfluidics

Department of MECHANICAL ENGINEERING
THE UNIVERSITY OF UTAH

WasatchMicrofluidics

Background:

The pump will be a sub-component of a high throughput surface plasmon resonance instrument that is used by drug companies to identify and characterize potential new drugs.

Objective:

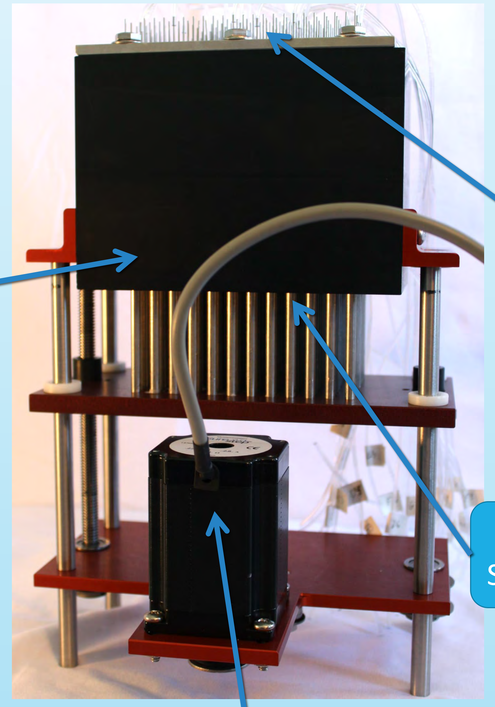
Design and manufacture a single, compact, relatively inexpensive, non-contaminating, highly accurate pump system capable of pumping 96 channels simultaneously.

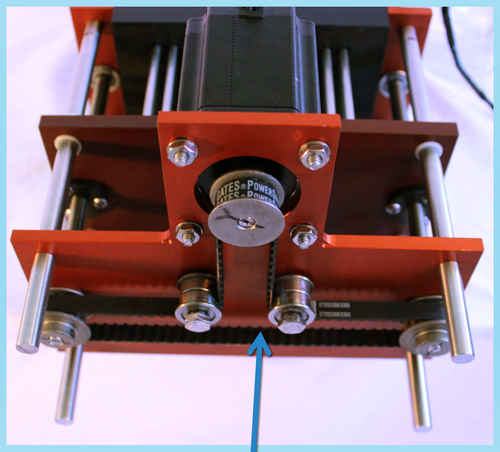
Specifications:

Requirement	Ideal	Actual
Flow rate	5-200 µL/min	13-200 µL/min
Pumping Volume	1.25-3 mL	1.25-3 mL
Pumping Resolution	±62.5 µL	±1.6709 µL
Product Dimension	12”X12”X12”	8”X6.5”X12”
Tubing Diameter	125-700 µm	500 µm
Total Cost	$1400	$1350

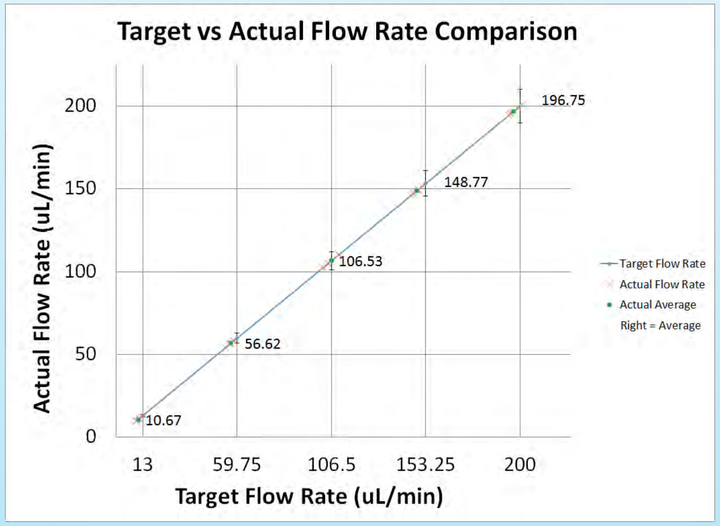
Recommended Future Improvements:

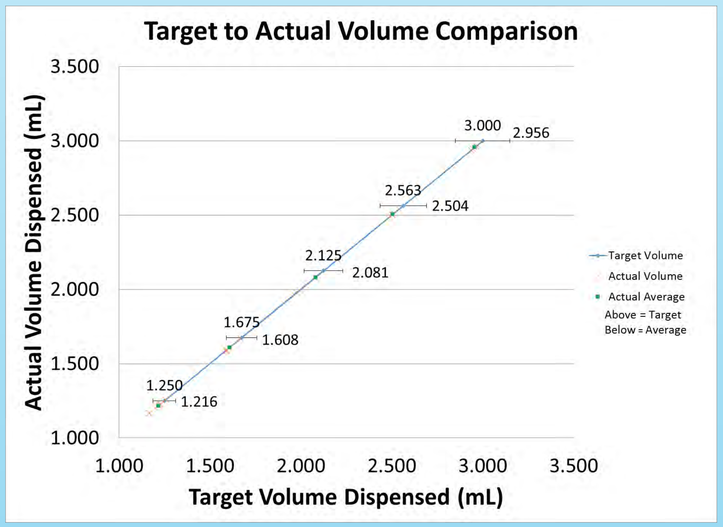
To meet the lower flow rate specification (5 µL/min), a gearbox can be added to the stepper motor.





Results:





Due to the limitations of the motor driver, the lower flow rate limit was not reachable. The lowest flow rate that was reached was 13 µL/min. Graphs display all samples taken, as well as the mean of each group.

Conclusions :

The 96 Channel Pump was successfully constructed and has the capability to meet all specifications. Results of testing have validated the effectiveness and accuracy of the pump.