

Team 8- The CultiGator

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Abstract

Our design will provide a unique, all in one functionality that will set it apart from any microbioreactors currently on the market. The environment the cultures are exposed to can be changed quickly and easily using a user interface with touch screen and voice control capabilities. Unlike most shakers on the market, our device uses a combination of motors and custom designed parts to allow for shaking in the usual linear and orbital patterns as well as the unique double orbital pattern. Our design utilizes a unique arrangement of mirrors and a rail system to allow OD measurements to be obtained for the culture in any tube or well plate with the use of only one laser. In terms of safety, the device will automatically shut off in the case of dangerous forces or pressures. Additionally, our design has the built-in functionality of a BSL2 safety cabinet.

System Overview

Liquid Handling manipulates desired fresh and waste media.

Measurement uses a filter cube, mirrors, and a laser to report changes in quantity of the culture

Environmental Control regulates temperature, agitation, and lighting.

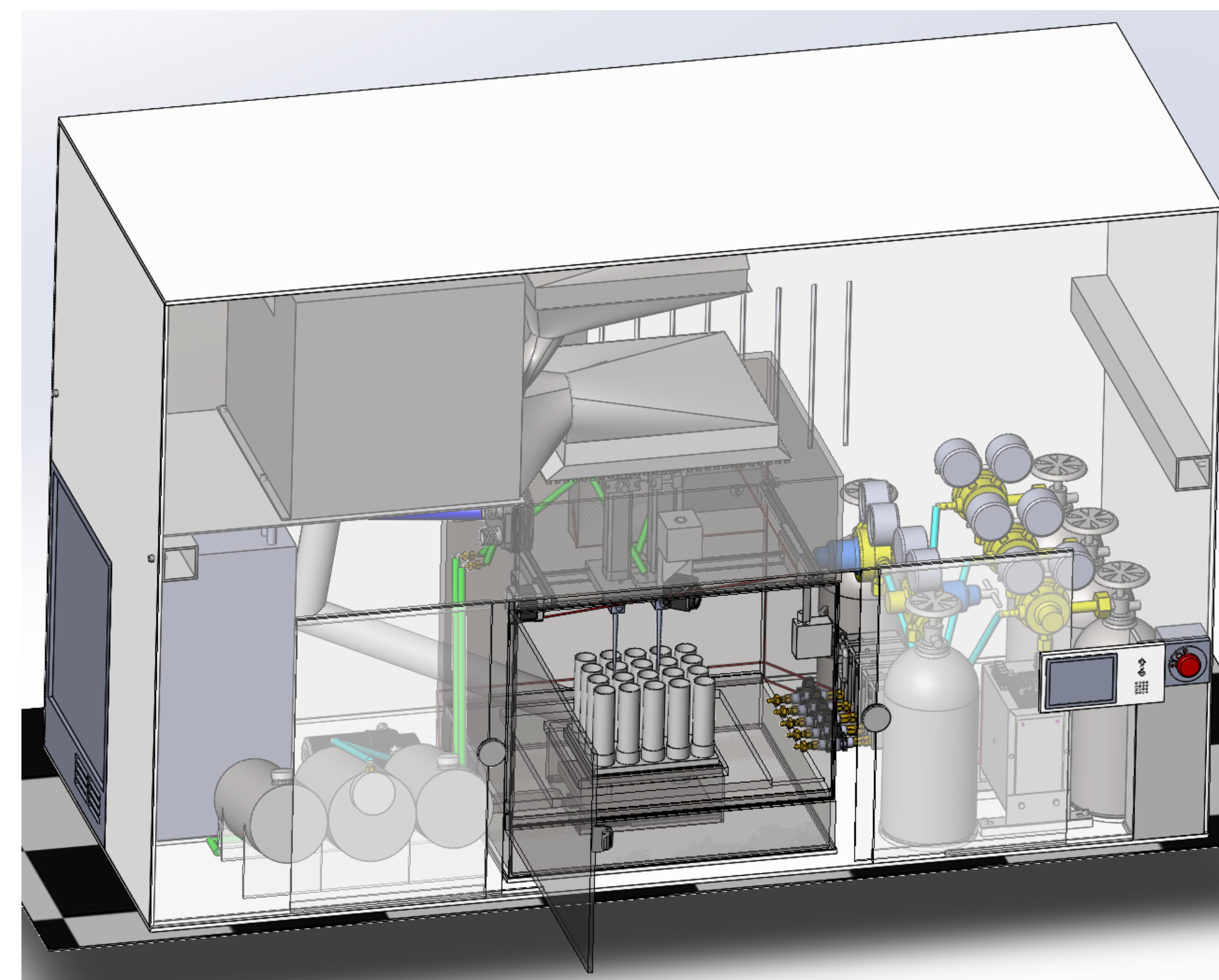
Safety & UI includes touch screen and mechanical input and force-based safety limit shutoff for all systems.

Gas Handling controls atmosphere composition inside the vessel.

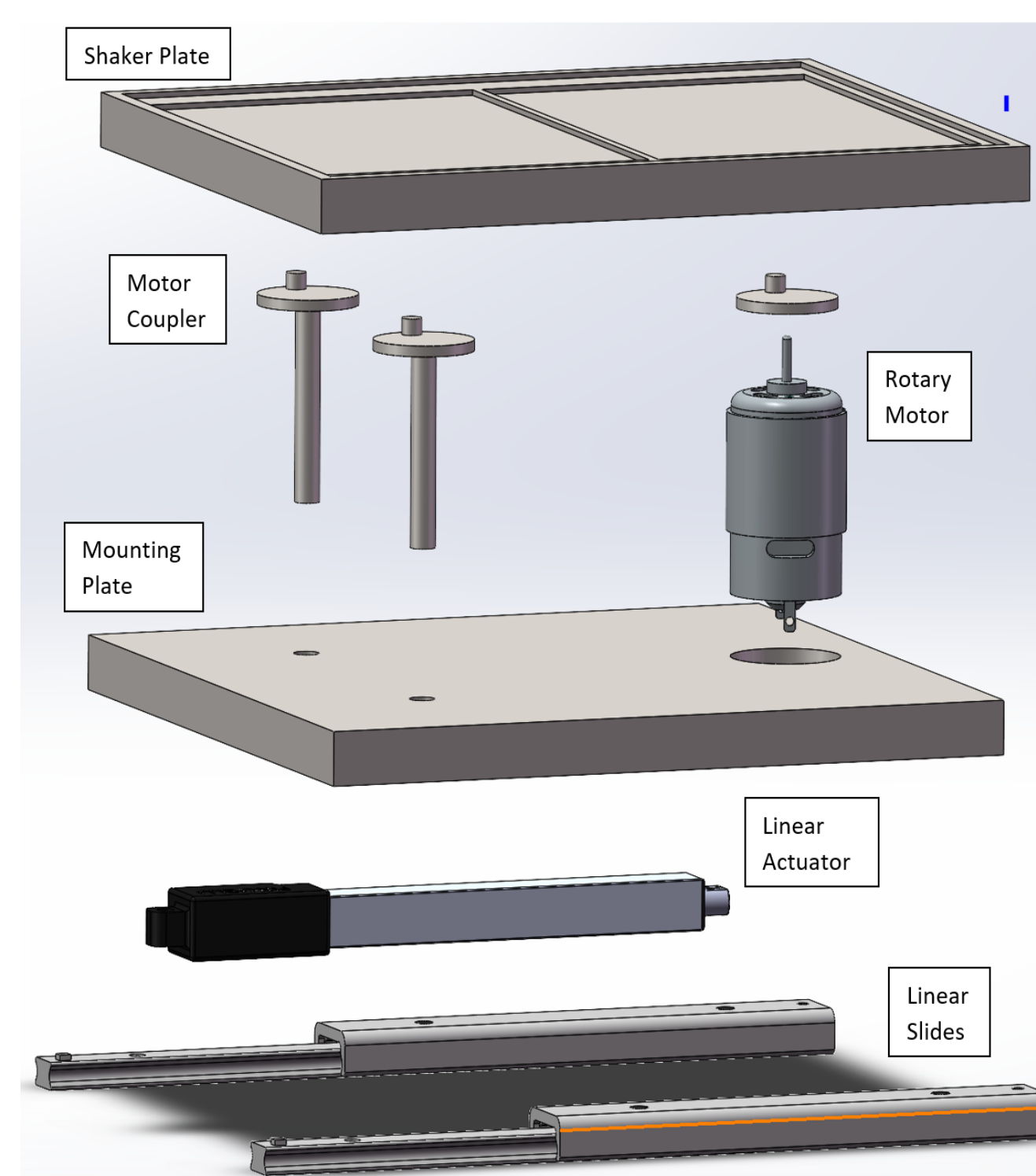
Experimental vessel ensures controlled environment and regulates air circulation

Frame & Mounting contains all components and prevents the user from contacting harmful surfaces

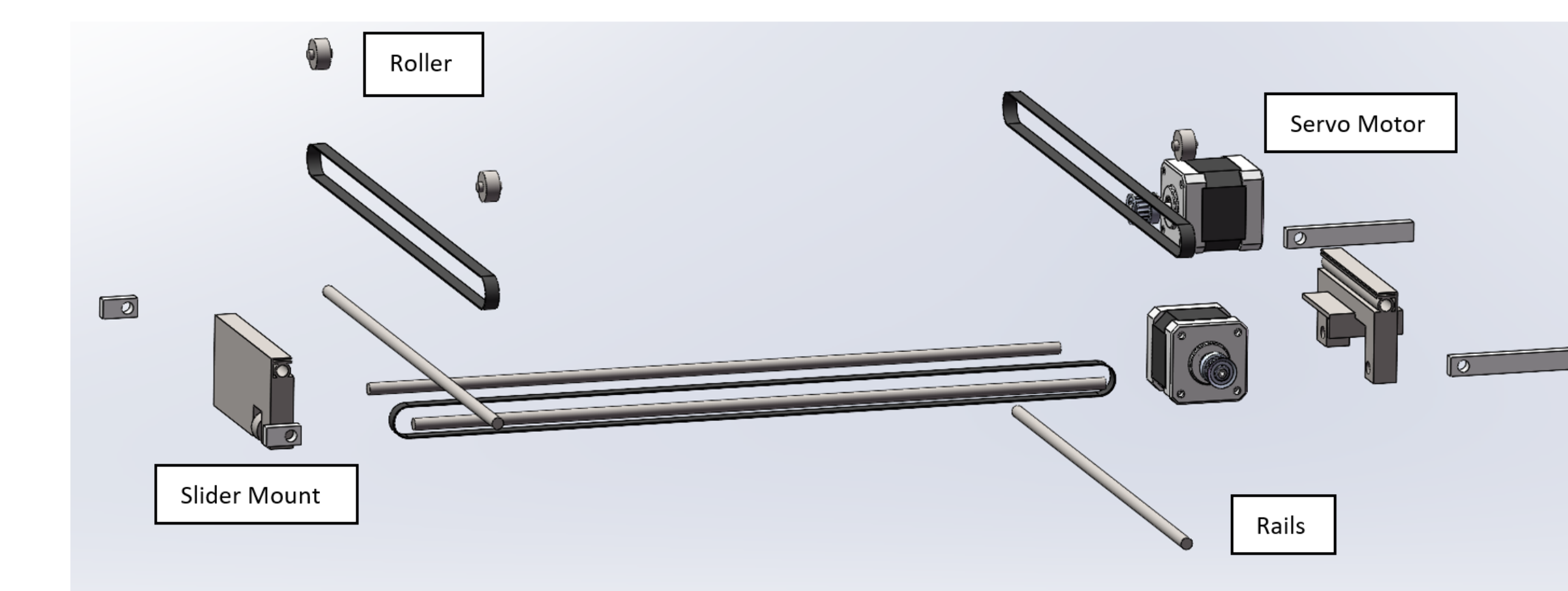
Full System



Exploded Views



The shaker system (left) utilizes a linear actuator and rotary motor to achieve transfer orbital double orbital and linear motion during experimentation.



The rail system (below) provides x and y axis motion to move the head which supplies liquid and directs the laser to the specified wells/test tubes.

Design Specifications

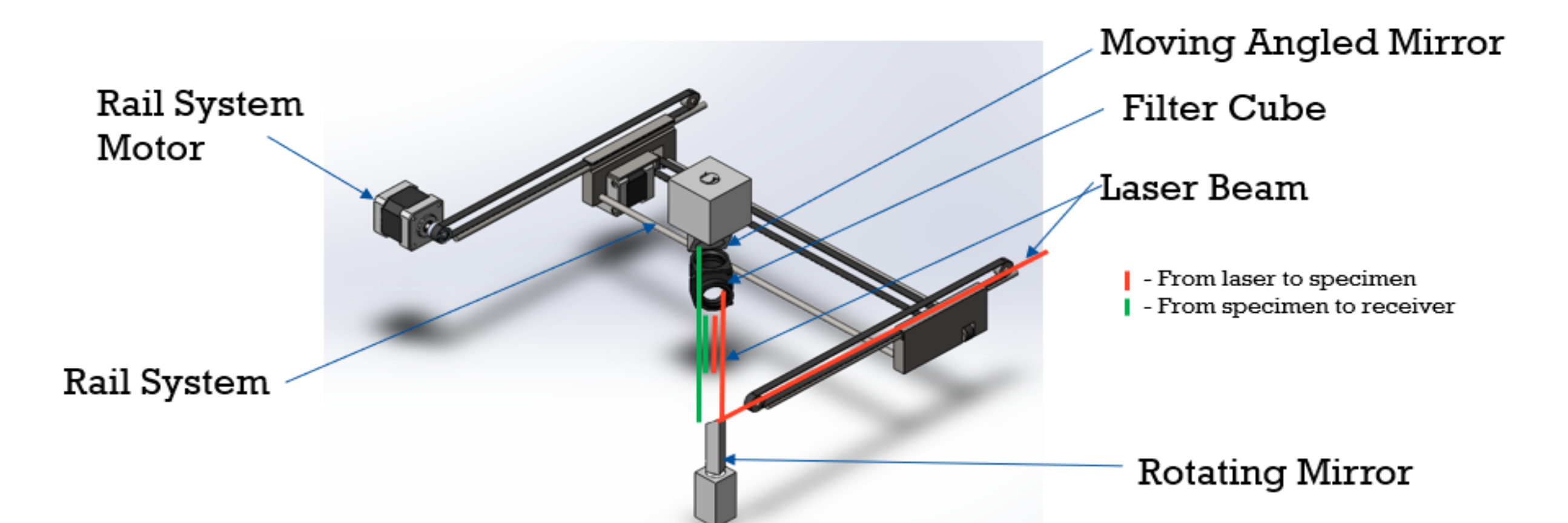
The CultiGator is designed to fit on a standard lab bench work top area.

Total weight: 21.6 lbs (9.8 Kg)

Overall Dimensions: 60 in x 24 in x 38.5 in

Laser Geometry

Measurement System

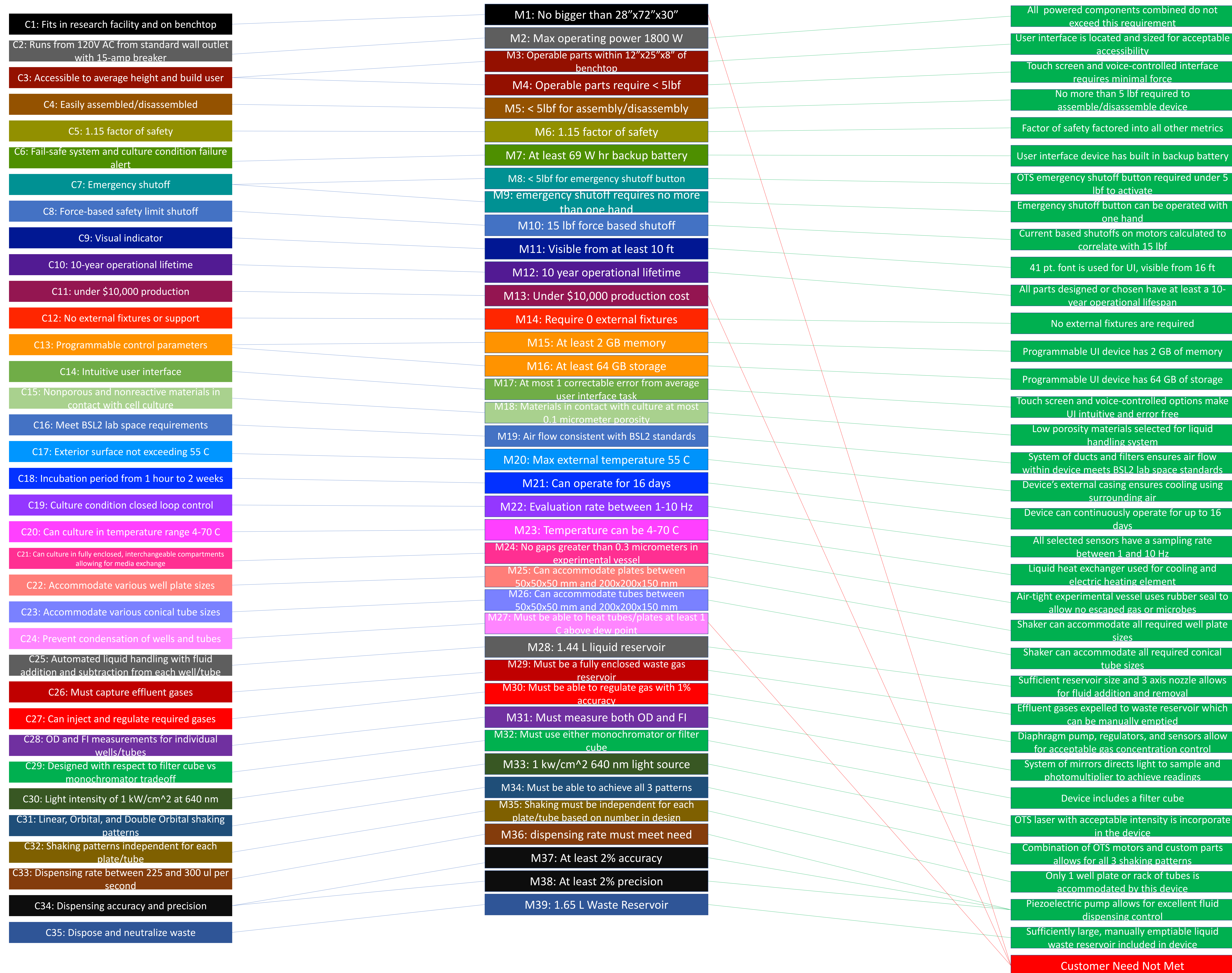


The measurement system features a series of mounted mirrors capable of redirecting a laser into any well on the system. The light is sent through a filter cube and output is read by a photomultiplier tube.

Cost Estimate

Process	Cost (\$)
OTS	\$13,382
Modified OTS	\$467
Raw Materials	\$1,414
Manufacturing Labor	\$3,296
Energy Consumption	\$1,170
Assembly Labor	\$2,382
Total Cost	\$22,111

Customer Needs Map



Customer Need Not Met