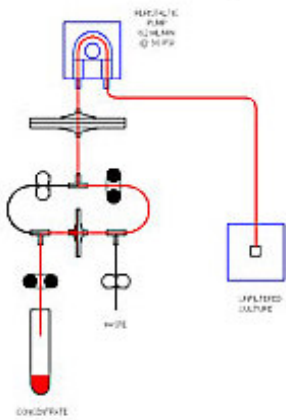


Portfolio : Cell Concentrator

Business Need

Solid Advantage's client, a biotech innovator, identified a market opportunity for a detection system that could rapidly assay foodborne pathogens at food processing labs. Existing systems took 72 hours. Pathogen detection in 12 hours was key. A device that could concentrate the cells in a bioculture would be critical to a rapid testing system.

Solution Concept



We assembled a working prototype cell concentrator from filters, pump, and tubing. Cell culture fluid passed through the system, and formed a bacterial concentrate on the filter's membrane.

Then we configured a laboratory device design, based on this filtration principle, which would form standard concentrations continuously. While a pump was running, pinch valves would sequence, to route fluid through the filters and perform a backwash to eject concentrate.

Loading and unloading disposable tubing, filters, and vial would be fast and easy, so that many tests could be performed each day. Concentrate would be manually transferred to a detection

instrument. Cycling would be electronically controlled. Operator interface would be switches. The user would experience a concentrator that would be simple, rugged, easy to sterilize, and inexpensive.

Device Design

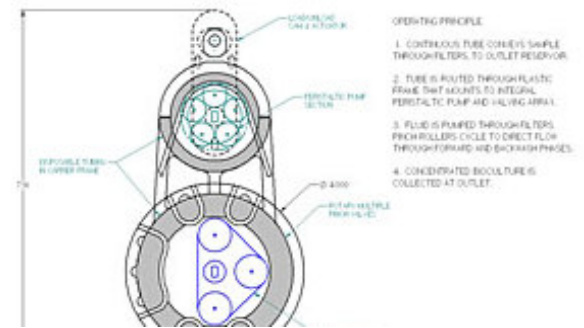


We modeled the device, integrating tubing, filters, solenoid pinch valves, pump, and vial. We created a plastic benchtop housing to package this hardware, a control circuit board, and the operator interface panel. The concept appealed, but component prices made this initial configuration too costly.

We drew a second concept diagram, this time packaging the tubing and filter on a carrier. This disposable cartridge would engage an integral, rotary, multi-station pinch valve and a peristaltic pump, also built-in. Integrating the valving and pump with the housing reduced costs dramatically.

In a parallel development, the client's biochemistry staff concocted an enriched agar that would rapidly grow a culture to required concentrations, producing a testable sample, without filtration, in 12 hours. This welcome new research opened a path to a radically simpler solution.

We then modeled and tooled a disposable culture tray to work with the enriched agar. It could





with the enriched agar. It could be manufactured for pennies, by vacuum forming and die-cutting PETG sheet material. After validation testing, this tray became the solution of choice, enabling very low cost, high volume production. Patents were registered on this device.



Benefits

The culture tray cell concentrator was paired with a laser-based instrument in a rapid detection system that worked very well. Our

client was then poised to exploit their targeted market opportunity. Solid Advantage industrial designs and product development were integral to this achievement. Our client also engaged us to collaborate on the assay instrument, described in another case study on this site.

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