

Re-ventilator Project blog: day 11, 3/29/20

Hi Everyone,

We are currently on our 11th day of trying to develop a ventilator that can effectively save lives and make an impact on the COVID 19 Pandemic. Thanks again for all the help, questions and valuable insights.

We've been involved in deep technology development for over 3 decades and typically in our primary business we rarely see competitors as we generally take on the hardest of the hard projects. In these types of projects, failure is intimately intertwined with success, and failure is something to be planned and managed for and quickly learned from and adapted to in a rapid, yet thoughtful process that ultimately leads to success(though not always). Although the Re-ventilator (the new name for our project and device) contains technically nothing really new, the paucity of the resources, the newness of the application (at least to us), the extreme immediateness of the need, and the basic lack of a supply chain, provide challenges aplenty. Deep technology development is a battle of inches, and we are now deep in the trenches fighting it out to get everything to work. This is where we are at our happiest.

Updates

- Our first attempts with a motor controller was not successful. We could get the motor running, but with this particular controller we would have to write a lot of new firmware to get it operating precisely. 3 phase motors require precise control of the 3 pulses and their relationships and how they change as the power is ramped up and down quickly.
- These 3 phase motor controllers are very prevalent in the Radio Controlled world of planes and drones. We have received a few different ones and will be testing them on Monday.
- If this RC motor controller works, this will have implications for the embedded computer and software, simplifying the system significantly.
- The next step after we get the blower up and running and can control it, we will have our test station running to begin initial operation of the unit. The initial steps in the "bring up" process is initially envisioned as follows.
 1. Control the driver and blower to get 1 second pulses, 12 times a second.
 2. Understand how high in air pressure (which is just blower speed) we can pulse the motor in this configuration.
 3. Attach the blower to the test lung to begin to precisely measure the output and correlate with internal sensors.
 4. Use the measurements to provide either precise pressure delivery or precise volume delivery.
 5. Using the UK NHS test plan begin to test initial system to the plan to see what levels of control we can achieve.
 6. Move to GUI development and feature introductions.

- The UK Government has released a detailed requirements document for a “rapidly manufacturable ventilator”. In these requirements are very detailed qualification test plans. From a product development perspective, these are pure Gold. The difference between product development heaven and hell is precisely knowing what the market wants, and what are the accepted criteria for measuring if you achieved those requirements, or not.
- We’re up to 20 donated CPAP machines and we are taking them apart to get them ready for first prototypes.
- We are planning to build about 20 units for testing and demonstrations.
- We should have the test lung in a couple of days.
- We are also looking to purchase a gas analyzer to measure the O2 injection and mixing process.

As most of you probably have been notified, we have set up a Go Fund Me page to receive donations. These funds will mostly go to buying parts and equipment, and paying for some EE and software development time. Anything you can do here would be appreciated.

The Colorado Springs Gazette is going to be doing a story on our effort and hopefully the wires will pick it up and we’ll have more attention.

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