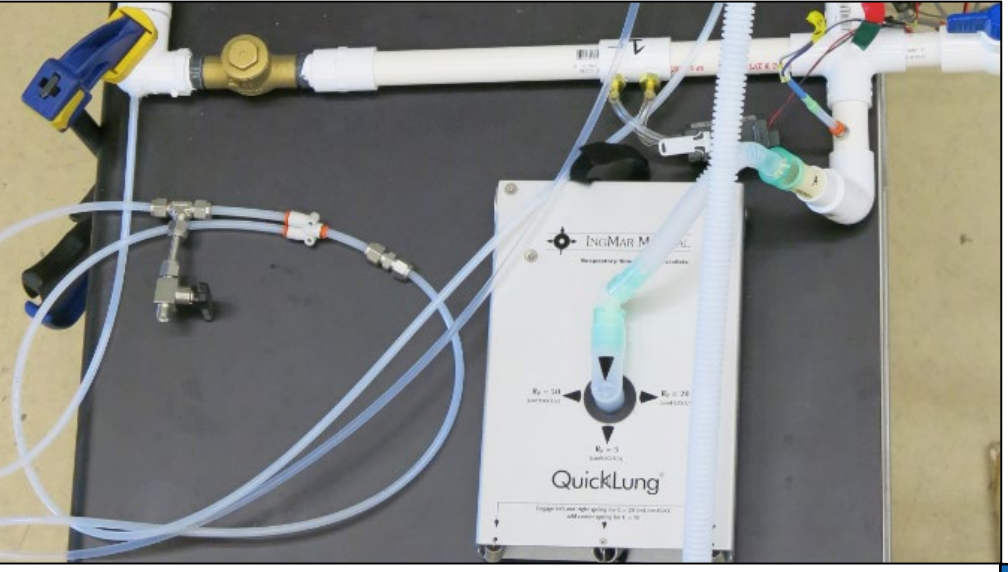

Tech Snapshot

COVID - 19

LA-UR-20-28794

VENTILATOR TESTBED

SUMMARY

A number of open-source ventilator designs have been published online since the outbreak of the COVID-19 pandemic. These ventilator designs have been created and released to help address the limitations in manufacturing and distribution timelines, and to help drive availability of more cost efficient ventilators. Many of these ventilators have been designed to be relatively simple to built and to use components that can be easily-sourced and acquired in large numbers from local suppliers. A test bed for evaluating the performance of these open-source ventilators was developed at Los Alamos National Laboratory as part of the Technology Evaluation and Demonstration program.

MARKET APPLICATION

Open source ventilator development efforts were initiated to overcome predicted shortages of commercial ventilators at hospitals and clinics where, and when, no other alternatives would be available. These open source designs exist at varying levels of maturity and have undergone different levels of performance testing. Early technical readiness designs and designs which have not been tested are significantly less likely to be adopted even if they are anticipated to function well, and at a lower cost point. Additionally, the average cost of a hospital ventilator ranges from $20,000 - $50,000 and many traditional ventilator components are in short supply or unavailable. An ability to provide technical performance characterization on low cost ventilator designs was needed, as was the ability to use these analyses to consider alternative sourcing for necessary ventilator parts

BENEFITS

- Utilizes laboratory hardware and software test capabilities
- Leverages LANL's expertise in science, engineering, simulation, and design
- Enables rapid evaluation of ventilator design performance under different simulated constraints
- Provides alternative component suggestions to preserve ventilator performance while maintaining affordability

CONTACT

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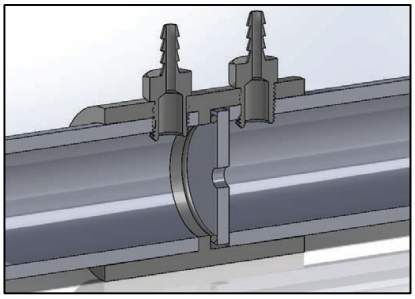
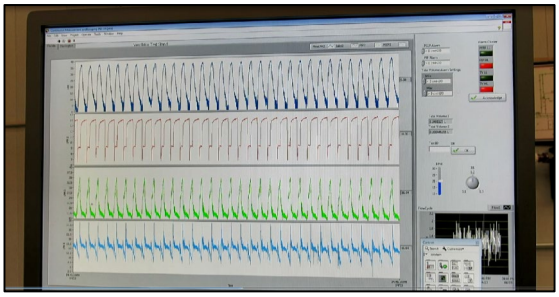
505-665-9090





WHY WE ARE BUILDING THE VENTILATOR TESTBED

The Los Alamos National Laboratory Ventilator Testbed was developed to help address ventilator manufacturing challenges. The Testbed aims to contribute timely and technically relevant feedback on observed ventilator performance and to help mitigate supply chain limitations by providing system and component level alternatives that preserve ventilator performance and cost point.

WHAT'S BEHIND OUR TECHNOLOGY

Los Alamos researchers worked with Presbyterian Healthcare Services (PHS) to distill functional requirements for open source ventilator systems. This led to development of a plan to evaluate the mechanical performance of each ventilator system against these requirements. These requirements also informed objective evaluation of the strengths and weaknesses of each ventilator system in light of subcomponent reliability, subcomponent supply-chain and commercial availability, system safety, and system functionality.

OUR COMPETITIVE ADVANTAGES

This Ventilator Testbed provides leverages Los Alamos' cross-cutting scientific, engineering, and computational expertise to explore the performance of ventilator designs. Testbed capabilities include evaluating the mechanical performance of ventilator systems, including measurements of air flow rates (integrated to give tidal volume) and pressures (inspiratory pressure, expiratory pressure), endurance testing of components, and evaluating performance repeatability.

OUR TECHNOLOGY STATUS

Los Alamos has a published paper outlining the initial work done using the Ventilator Testbed, a detailed description of the instrumentation, and recommendations for future work click here to view.

Please contact the Feynman Center at techsnapshot@lanl.gov if you are interested in learning more about the Testbed capability.

The ventilator testbed is an investigational capability and not a product. No claim of clearance or approval status, safety, or effectiveness is made herein. The ventilator testbed is not intended for clinical or patient use.

PUBLICATIONS AND IP

LA-UR-20-23365: Ventilator Demonstration & Test Bed: Final Report. 134pg.

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