NOVO Respiratory Assist Device (RAD)

Positive Pressure and Oxygen Therapy System with
Protection for Caregivers

WIP Snapshot 04/19/2020

NOVO ENGINEERING®
Better products to market. *Faster.*

NOTICE: This device is under development. I has not been tested on humans or submitted for regulatory clearance/approval

PROJECT OBJECTIVES

- Provide practical **oxygen-enriched, positive airway pressure** therapy to patients with respiratory insufficiency at home or in a step-down facility.
- Incorporate safety features that **protect health care providers from aerosolized virus**

NOTE: We blocked the vents on this vented mask for testing purposes

PRESUMED BENEFITS TO PATIENTS AND CAREGIVERS

PATIENTS:

- Non-invasive single or bi-level positive pressure therapy
- Oxygen enrichment
- Delay or avoid progressive hypoxemia and invasive ventilation
- Accelerate weaning from ventilator
- Minimizes backpressure during cough or sneeze
- Constant flow of fresh air and oxygen purges CO2
- **Designed for home use or step-down facilities**

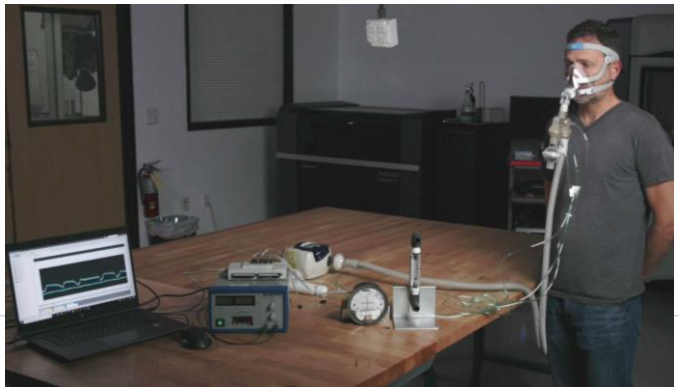
CAREGIVERS:

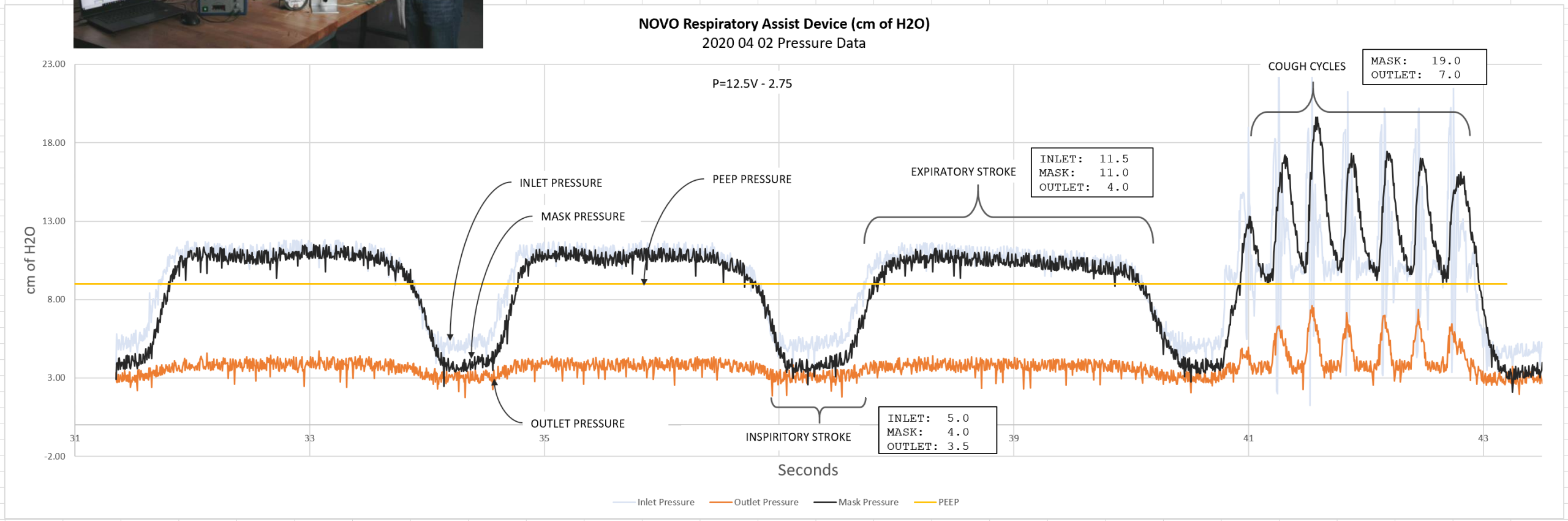
- **Prevents cross infection by containing and filtering all exhaled breath through viral filters**
- Works with standard CPAP, BPAP, or VPAP equipment
- Adaptable to any full-face, **non-vented mask**, with nonelastic headgear
- Mask pressure limiting valve prevents mask from leaking during cough or sneeze
- Can be combined with nebulizers, suction catheters, and other respiratory care devices
- Simple setup and operation with independent control over PEEP pressure and flow rate
- Safe, convenient method to drain condensate from the system

ADDITIONAL FEATURES IN PROCESS

- Improved CO2 purging
- Integration of a suction catheter
- Anti-asphyxiation valve
- Optimization of the over-pressure valve
- Adjustable PEEP and pressure relief settings
- Injection moldable version of the design

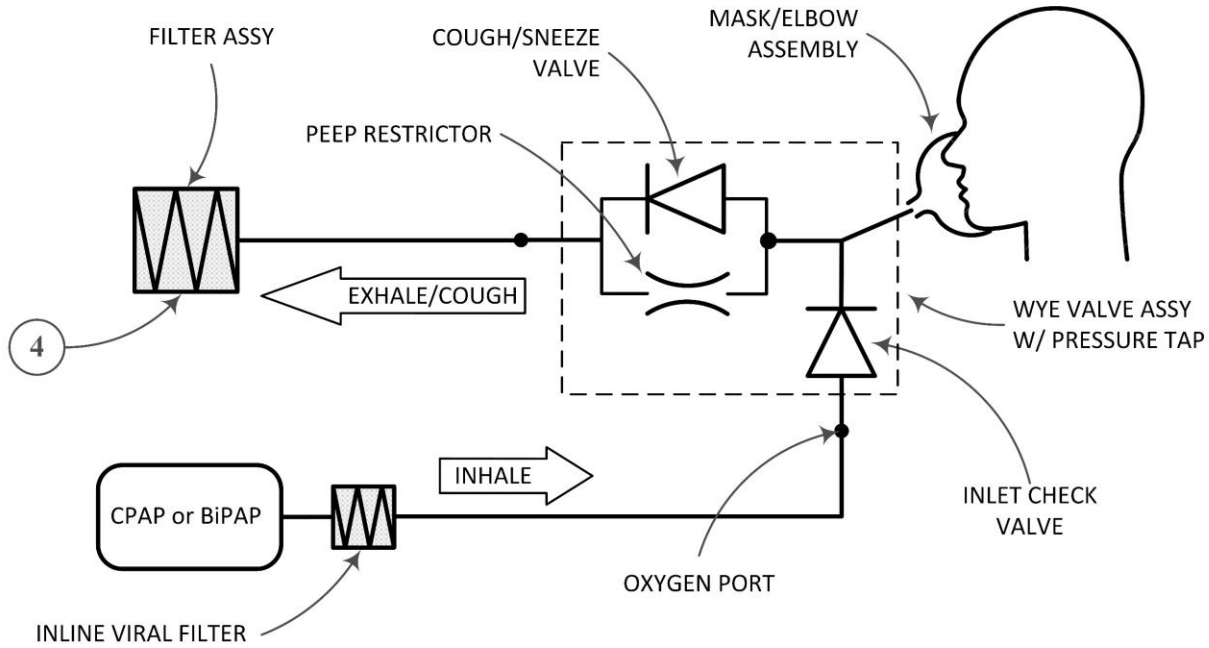
INITIAL SYSTEM TESTING



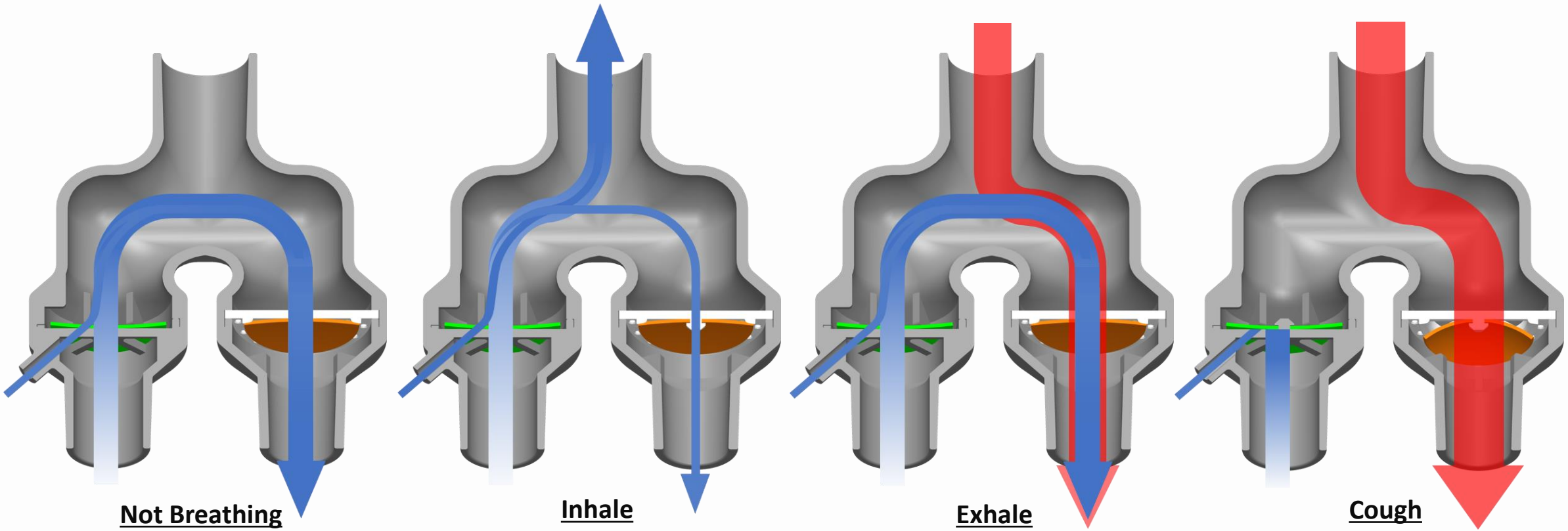


SYSTEM SCHEMATIC

RESPIRATORY ASSIST WITH OXYGEN, EXHALE FILTER, COUGH VALVE



BREATHING CYCLE



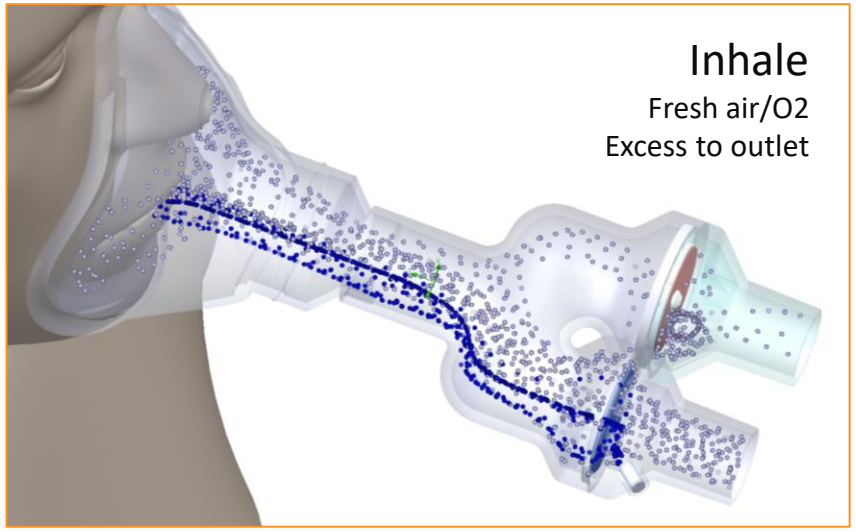
Not Breathing
Fresh Air/O_2 from inlet to outlet

Inhale
Fresh air/O_2 to lungs; excess to outlet

Exhale
Exhaled breath and Fresh air/O_2 to outlet

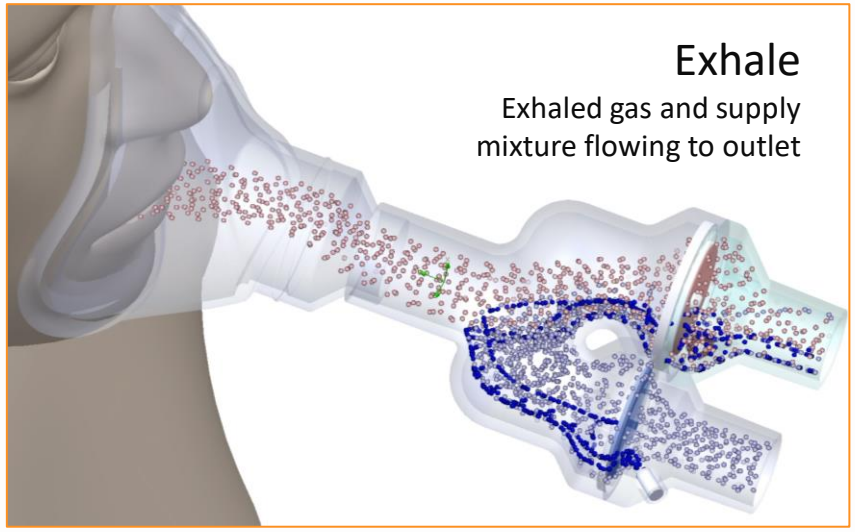
Cough
Exhaled breath to outlet; inlet-valve shut

FLOW SIMULATIONS



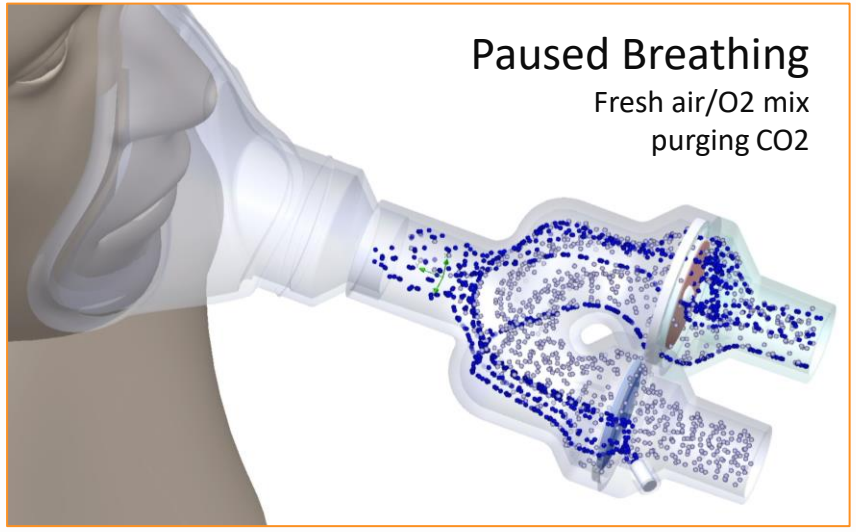
Inhale

Fresh air/O2
Excess to outlet



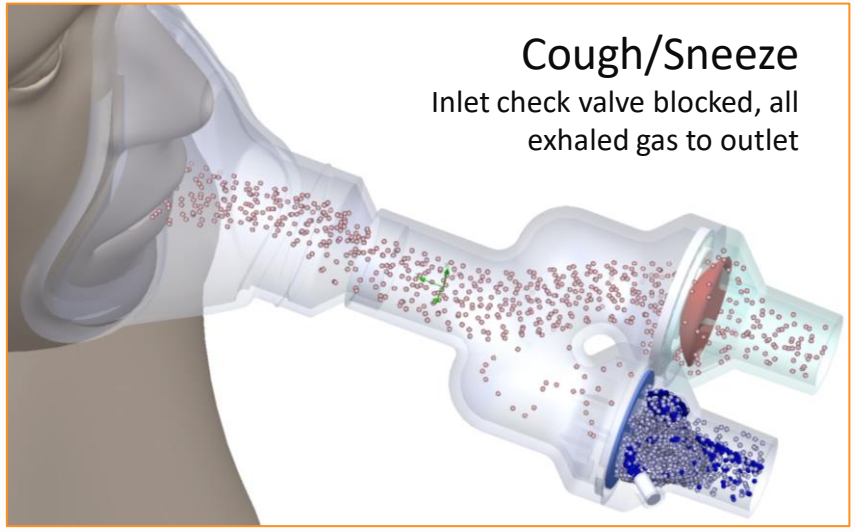
Exhale

Exhaled gas and supply
mixture flowing to outlet



Paused Breathing

Fresh air/O2 mix
purging CO2

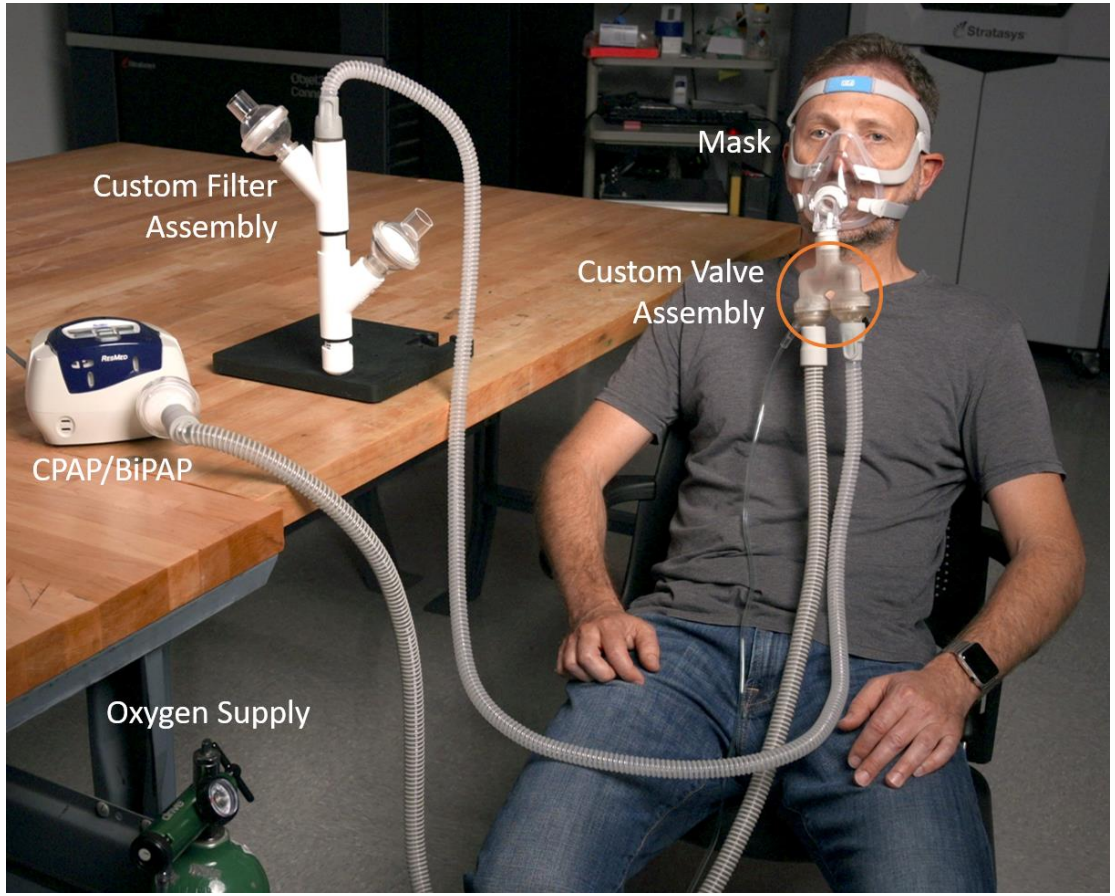


Cough/Sneeze

Inlet check valve blocked, all
exhaled gas to outlet

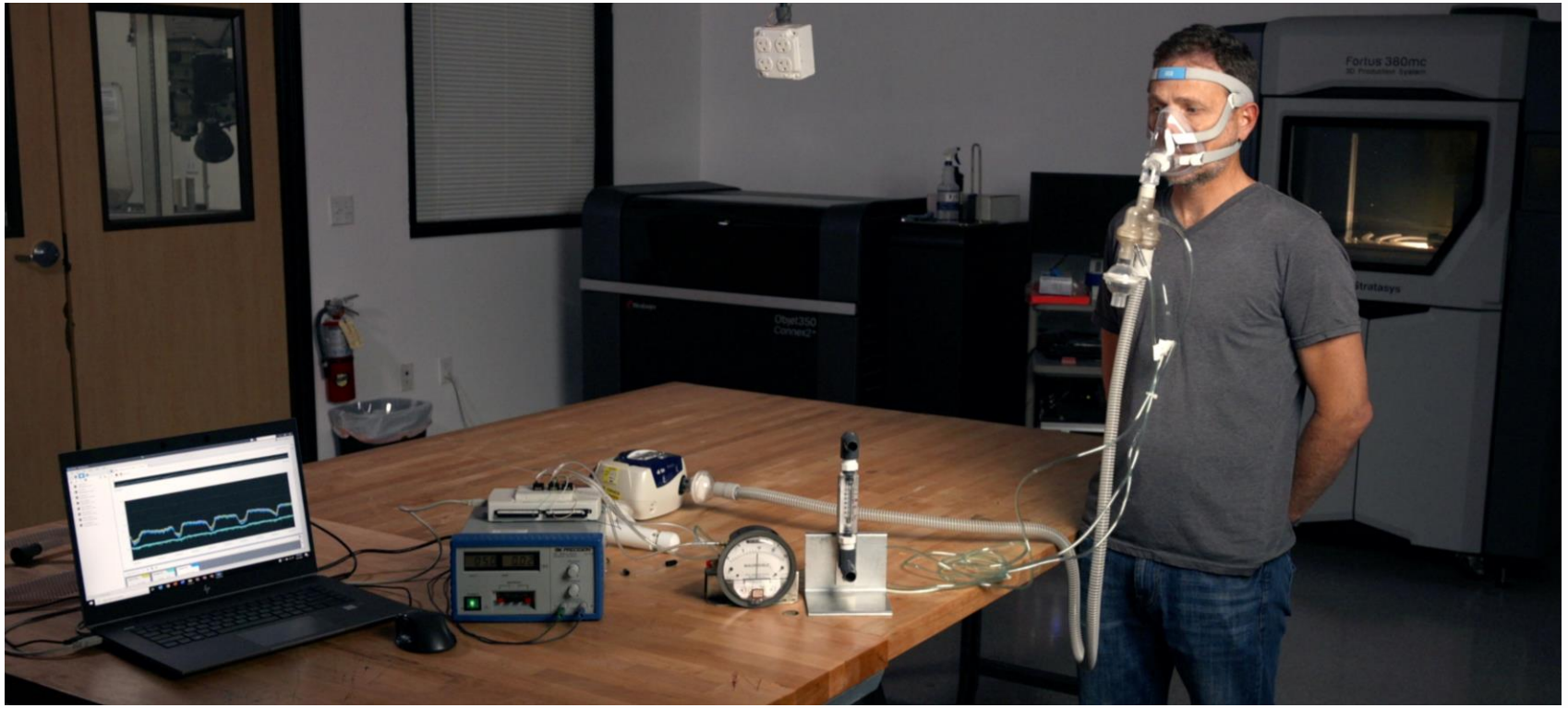
STRATEGY

- Use 3D-printed, screw machined, and die-cut parts for early versions
- Injection molding and die cut processes for higher-volume production
- For purchased items, specify standardized components available from multiple suppliers
- Recruit (medical) manufacturing operations to build with quality control
- Pair manufacturers with hospital systems close by for prescription & patient monitoring



WHAT WE NEED TO CONTINUE THIS WORK

- Clinicians to use the system under an informed consent agreement and provide feedback/support
- **Funding** to continue the development of the second-generation design.



THANK YOU

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