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Identification and Significance of Innovation

- Ventilation fan for future EVA suits
- Innovative regenerative blower technology
- Low operating speed (5,300 rpm)
- Compact, lightweight, and efficient
- All oxygen-safe materials

Phase II Research Carried Out

- CFD analysis and testing to develop efficient impeller
- Developed custom motor with isolated windings
- Measured detailed head/flow/speed performance maps
- Life testing under prototypical conditions in O₂ loop
- Measured response to dust ingestion in O₂ loop

TRL at the end of Phase II: 6

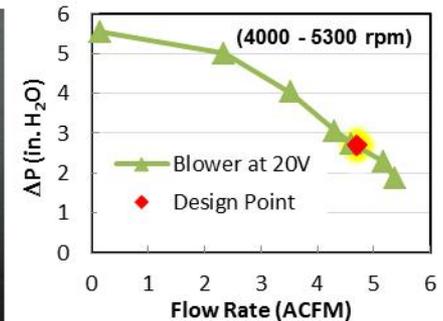
Phase II Technical Objectives Achieved

- Nominal design point (4.7 ft³/min @ 2.7 in. H₂O) at 5,300 rpm in O₂ at 4.3 psia (tip speed = 27 m/s)
- Low power: 8.3 W at nominal design point
- Compact: Diameter 5.6 in., volume 0.56 L
- Light weight: Mass = 0.61 or 0.75 kg (with or w/o duct)
- Safe and stable operation of blower for 1,364 hr in O₂
- Ingested high concentration of dust while running in O₂; no adverse effects; head/flow performance unchanged
- Final bearing set ran for over 800 hr in O₂ with no sign of degradation

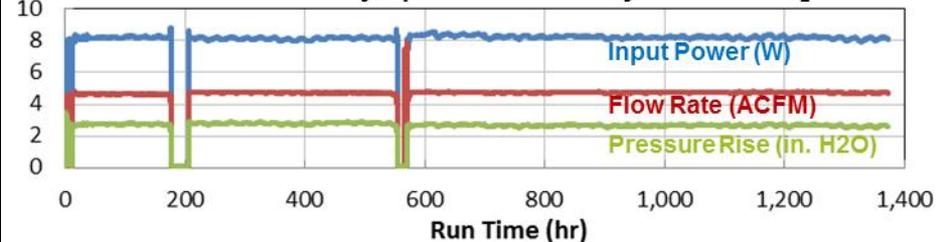
Prototype Blower



ΔP / Flow Performance



Safe and Steady Operation for Nearly 1400 hr in O₂



NASA and Non-NASA Applications

- NASA Application: Future space suit life support systems
 - Much lower rotating speed than alternative technologies
 - Improved oxygen safety, higher reliability, easier repair in situ
- NASA Application: ECLSS for manned spacecraft
 - Larger than spacesuit PLSS but similar requirements
- Non-NASA applications
 - Military: Ventilation cooling for chem/bio gear, body armor, EOD, and level-A HAZMAT suits
 - Commercial: Ventilation cooling for road work, law enforcement, construction

Contact:

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NON-PROPRIETARY DATA

MTG-12-08-4288