NASA SBIR/STTR Technologies

Compact, Efficient, and Reliable Ventilation Fan for EVA Suits

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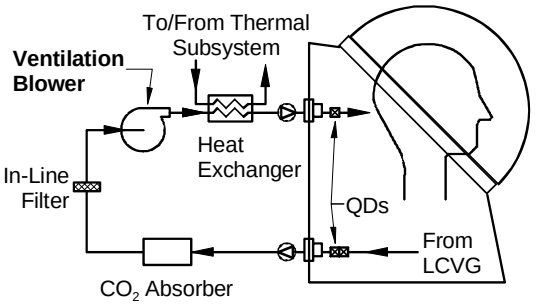
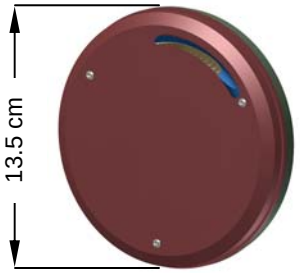
Identification and Significance of the Innovation

- Ventilation fan for future EVA suits
  - Constellation Space Suit calls for dedicated ventilation fan
  - Extended operation in a harsh environment
- Significant benefits from Creare's ventilation blower
  - Low rotating speed (5400 rpm)
  - Small size, light weight, compact configuration
  - Can be fabricated from a variety of O_2-safe materials
  - Low power consumption, low noise
  - Can provide "buddy mode" flow at 9400 rpm
- Innovative turbomachine and motor designs
  - Blower configuration optimal for high pressure rise application
  - Innovative motor simplifies packaging and cooling
- Expected TRL at end of contract: 5-6

Ventilation Subsystem



Blower Design



Predicted Blower Performance

Flow (actual ft^3/min)	4.7
Pressure rise (in. H_2O)	2.7
Rotating speed (rpm)	5400
Power consumed (W)	< 8
Mass (kg)	0.40
Dimensions (cm)	∅13.5×2.5

Technical Objectives, Phase I Results, and Phase II Plan

- Safe and Reliable Ventilation Fan
  - Meet challenging head/flow requirements
  - Compact, lightweight, efficient
  - Safe and reliable in an O_2 environment with lunar dust
- Phase I accomplishments
  - Proof-of-concept blower met CSSS head/flow requirements
  - 5400 rpm, 9 W power consumption in 4.3 psia environment
  - Designed Phase II prototype system
- Phase II work plan:
  - Optimize blower, motor, bearings
  - Test for endurance in prototypical O_2 environment
  - Deliver blower to NASA

NASA and Non-NASA Applications

- NASA application: Constellation Space Suit System
  - Much lower rotating speed than competing technologies
  - Improved safety, higher reliability
- NASA application: ECLSS for manned spacecraft
  - Pressurized lunar rover
  - Similar requirements to PLSS ventilation subsystem
- Non-NASA applications
  - Military: Ventilation cooling for chem/bio gear, body armor, level-A HAZMAT protective suits
  - Commercial: Ventilation cooling for construction work, law enforcement, outdoor work

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