

Low Cost Cathode Blower

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Abstract:

Solid Oxide Fuel Cell (SOFC) systems require blowers to provide motive force to incoming atmospheric air, in order to overcome the pressure drop in the various valves and heat exchangers, and in the fuel cell stack. The energy required to drive this component is typically one of the largest parasitic loads for the SOFC system; consequently, high blower efficiency is paramount to high system efficiency. Furthermore, blower cost, reliability and oil or grease contamination free operation are critical issues. The manufacturing cost target for the blower is \$100 per unit based upon a production volume of 50,000 units/year. A cathode air blower meeting above key requirements has not been available in the market.

R&D Dynamics has designed and tested a low cost cathode blower which has following features:

- Low Cost
- High Efficiency
- High Reliability
- No Oil contamination
- Maintenance Free
- Low Noise

The blower was developed using Design for Manufacturing and Assembly (DFMA) techniques and has only 17 parts. A low cost controller was developed and tested which can operate the blower over a wide operating range. The blower is planned to be system tested in SECA member's facility upon completion of the development. Successful development of the low cost blower will enable higher system efficiency and lower cost of SOFC systems.

High Temperature Cathode/Anode Recycle Blowers for Large Megawatt Size SOFC Power Plants

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Abstract:

Development of large (greater than 100MWe) Solid Oxide Fuel Cell (SOFC) power blocks will enable affordable, efficient and environmentally friendly electrical

power from coal. SOFC based power block configurations for coal fueled central generation applications could benefit from recycling a portion of the high temperature (e.g., 800-850°C) cathode and anode gas effluent back to the incoming stream in order to improve the overall plant efficiency. Key requirements of the cathode and anode recycle blower are:

- Reliability at high temperature (up to 850 °C), which is critical to ensure safe long-term operation.
- Contamination free operation (no oil or grease)

Currently, there is no blower available to meet these challenges; hence an innovative high temperature blower technology is needed.

R&D Dynamics is developing a dual recycle blower which can be used for either anode gas recycling or cathode gas recycling. The blower being developed has following features:

- High temperature capable (up to 850°C)
- Highly reliable
- Highly energy efficient
- Low life cycle cost
- Oil free
- Maintenance free
- Higher design life (>40,000 hrs)
- Lower noise (< 70dBa)
- Easily scalable
- Turn down ratio up to 5:1

R&D Dynamics is planning to test the blower in year 2011 and make the high temperature recycle blower technology available for power module testing of SECA members in year 2012.