NAVAIR

ADVANCED TECHNOLOGIES GROUP, INC.

HYDRODYNAMIC SEALS FOR ENHANCED ENGINE PERFORMANCE

Seal and Housing

Topic Number: N00-005 (NAVAIR)

SBIR Investment: $973K
Project Revenue: $26M

Advanced Technologies Group, Inc

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About the Technology

In order to accommodate the next generation of turbine engines, an advanced gas turbine seal is needed capable of improved performance, reduced leakage, and both forward and reserve engine rotation. Legacy engine seals do not meet engine demands for durability or forward and reverse engine rotation for the V-22 Osprey, without damaging seals and increasing leakage. Fixed clearance labyrinth seals provide a varying gap due to engine and aircraft dynamics, while brush seals wear out over time. Both seals have inconsistent effective clearances at different power points of the engine, resulting in decreased engine performance.

Advanced Technologies Group, Inc.'s (ATG) Hybrid seals (H-Seal) are capable of forward and reverse engine rotation, improves leakage over existing brush seals by 50 percent, increase durability, reduce operating cost, and are compatible with lower tolerance designs. ATG incorporates the advantages of a compliant brush seal with the non-wearing characteristics of a hydrostatic bearing that maintains a fixed gap in relationship to the rotor regardless of roto excursions. The H-Seal produces a non-contacting seal capable of long life, under high surface speed and temperature conditions. ATG received a contract from NAVAIR to provide H-Seals for gas turbine engines, contingent on testing results. The company also received funding from Army to test the compressor discharge seal for the Black Hawk Helicopter.

Military and Commercial Significance

ATG H-Seals meet engine goals for thrust-to-weight ratios, emissions, durability, fuel consumption, and operating cost. By replacing just two turbine seals, fuel use is reduced by 2 percent resulting in improved engine efficiency and a reduction in turbine air temperature. Studies have shown a 10-degree reduction in turbine temperature increases turbine blade life by 50 percent.

About the Company

Advanced Technologies Group, Inc., ATG, is a privately held engineering R&D firm that specializes in the design and development of precision cryogenic and gas turbine turbo-machinery. By providing innovative, timely, cost-efficient design and consulting services, ATG has seen a large increase in government and private-sector clients. The success of the hydrodynamic seals was due to the Navy SBIR program, and has enabled ATG to acquire outside funding and a reputation for quality with major gas turbine engine manufacturers and component suppliers. ATG is currently licensing the technology and manufacturing the technology in-house.

APPLICATIONS

- NAVAIR: Osprey - Enhanced engine performance
- Army: Black Hawk Helicopter - Enhanced engine performance
- Commercial aviation engines, industrial gas turbine engines, steam turbines - Seals for enhanced engine performance
- Private sector - Gas turbine, turbopump, and other gas path sealing applications