



Department of the Navy – Success Stories –

NAVY AIR

ADVANCED TECHNOLOGIES GROUP, INC.
HYDRODYNAMIC SEALS FOR ENHANCED ENGINE PERFORMANCE



Seal and Housing

6

Topic Number: N00-005 (NAVAIR)

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

Advanced Technologies Group, Inc.

841 SE Central Parkway
Stuart, FL 34994
(772) 283-0253
www.atginc.com
jstark@atginc.com
John Jank

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 reverse 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, improve 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 rotor 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.


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, turhopump, and other gas path sealing applications

About the Company

A diversified 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.

DEPARTMENT OF THE NAVY
SBIR/STTR
SUCCESS STORIES
Small Business Innovation Research/
Small Business Technology Transfer



Website link: <http://www.navybsir.com/docs/navybook-07.pdf>

ATGI develops disruptive technologies for the aerospace and private sectors. ATGI is an independent, privately held engineering research and development firm. ATGI was formed in 1995 to meet the needs of government and private-sector clients with technological challenges that defy conventional solutions. ATGI has the capability to design, develop, manufacture prototypes and perform tests in their laboratory facility, by providing innovative, timely, cost-efficient design and consulting services. ATGI has seen both our government and private-sector client base broaden significantly.



Tomorrow's Technology Today

ATGI provide specialized services to clients that are developing emerging technologies, pushing the frontiers of innovation to develop advanced solutions to challenging problems in the markets of Aerospace, Defense, Homeland Security, Transportation, Marine and Ocean Systems and Medicine and Healthcare. To find out more information, visit the ATGI website located at www.atgi.us

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