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Advanced Gas Turbine Systems Research

**Quarterly Report
October - December 1993**

January 1994

Work Performed Under Contract No.: DE-FC21-92MC29061

For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia

By
South Carolina Energy Research and Development Center
Clemson University
Clemson, South Carolina

MASTER

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Morgantown Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880**

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South Carolina Energy Research and Development Center
Clemson University
386-2 College Avenue
Clemson, South Carolina 29634-5181**

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TECHNICAL PROGRESS REPORT
ADVANCED GAS TURBINE SYSTEMS RESEARCH
COOPERATIVE AGREEMENT DE-FC21-92MC29061

OCTOBER 1, 1993 TO DECEMBER 31, 1993

SUMMARY

The second Request for Proposals (RFP 94-01) was issued at the end of November. Research areas were restricted somewhat compared with the initial RFP, as the Industrial Review Board wished to concentrate on the highest priority technologies. Performing Members now number 61, with another four universities expressing interest in joining. Development of the Materials Technology area of the ATS program is proceeding, with resolution expected in early 1994 to support issuing solicitations by the summer. The first AGTSR workshop has been scheduled for late February in Nashville to discuss combustion modeling.

MEMBERSHIP

The number of university Performing Members is presently 61, a net increase of two since the last report. There are four new members (Washington, Yale, Central Florida and Wisconsin-Madison), and two elected to discontinue participation in AGTSR (Cal Tech and South Alabama). Ten site visits were made in this quarter, bringing the total for 1993 to 42.

Updated lists of members and the states represented are attached. The number of states has increased to 33.

SUBCONTRACTS

All ten recipients of subcontracts have begun work. As expected, the initial billing levels have been on the low side as the participants gear up their programs. Through the end of December, invoices totaling \$165,738.00 have been received. AGTSR is monitoring technical progress and approving the invoices accordingly.

RFP 94-01

The second RFP was sent to the Performing Members November 29, with a bid date of February 4, 1994. IRB evaluation of the bids is scheduled for February 9-11, continuing the efforts to assure timely review and award of the proposals. Completion of the process by the March time frame is deemed to be best for university planning purposes.

The 1994 RFP limits the technology areas to the following:

- Advanced cooling and heat transfer
- Performance improvements
- Superalloy coatings and analysis
- Emission reduction concepts
- Blade vibration and aeroacoustical analyses

A long range plan was developed that will assure that all technologies of interest will be covered over the life of the AGTSR program. This plan will assure that the highest priority items are addressed first, and that universities will not waste time and effort preparing proposals that will not be considered.

The technology objectives for RFP 94-01 were approved by the IRB, and by METC on November 18. METC authorized issuance of the RFP based on expected release of the necessary ATS funds (\$4 million for FY94). It is anticipated that \$1.5 million will be available for the first year of the new subcontracts, with \$2.1 million required for 1994 for continuation of the ten projects awarded in 1993.

MATERIALS PROGRAM

The AGTSR Director is a member of the Advanced Materials and Turbine Technology Team established at ORNL to put in place the development plans for the Materials/Manufacturing portion of the ATS Technology Support program. Four of the manufacturers (Westinghouse, GE, Allison, and TP&M) have come to Oak Ridge to present their recommendations for development needs. Some team members visited Howmet (Whitehall) to obtain inputs from the largest material supplier, and visited Lehigh University to review their FGM (Functionally Gradient Materials) program.

The data collected will be summarized in a draft plan that will be issued for review in January. A solicitation for proposals should be out by early summer, with increased funding scheduled to be available for FY95. The relationships between this program and AGTSR will be part of the plan.

COMBUSTION WORKSHOP

Vanderbilt has volunteered to host the first AGTSR Technical Workshop, to be held in Nashville February 24-25. Representatives from each of the five subcontractors involved in combustion research, industry, and METC are scheduled to make presentations. The overall objective of the workshop is to exchange information and ideas, and assure technology transfer to the manufacturers. Several other universities plan to send representatives.

Other potential subjects under consideration for additional 1994 workshops are in the aerodynamic/heat transfer and materials areas.

SEMINARS

International activities in the gas turbine power generation arena are also being coordinated by SCERDC. On October 12, representatives from Sweden's Lund Institute of Technology (Dr. Tord Torrison), Royal Institute of Technology (Dr. Gunnar Svedberg), and National Board for Industrial and Technical Development (Mr. Sten Afeldt) discussed gas turbine and energy research activities at a seminar in Clemson. They are presently involved in cycle evaluation and assessing the use of biomass fuels.

A second seminar is planned for early February, with Dr. G. G. Olkhovsky from the Russian Thermal Engineering Institute as featured speaker.

OTHER ACTIVITIES

Director R. P. Allen and METC COR Paul Micheli have authored a paper on the AGTSR program, to be presented at the ASME IGTI Gas Turbine Exposition in The Hague in June. The paper describes the formation and operation of the AGTSR program, with its unique cooperative efforts among industry, academia, and government.

To better align subcontract expenditures with Federal funding timing, the request for contract extension by SCERDC for AGTSR will cover the period from April 1, 1994, through December 31, 1994. Subsequent requests will cover the calendar year from January through December.

UNIVERSITIES REPRESENTED IN AGTSR PROGRAM
Through December 31, 1993 (61)

*University of Alabama-Huntsville	Michigan State University
*University of Arkansas	Michigan Technological University
*Auburn University	*University of Michigan
*Brigham Young University	University of Minnesota
*University of California-Berkeley	*University of Missouri-Rolla
*University of California-Davis	*University of Notre Dame
*University of California-Irvine	*University of Oklahoma
*Carnegie Mellon	*Penn State University
University of Central Florida	*University of Pittsburgh
*Clarkson University	Princeton University
*Clemson University	*Purdue University
Cleveland State University	*University of South Carolina
*Cornell University	University of South Florida
University of Dayton	Southern University
*University of Delaware	*Syracuse University
University of Denver	*University of Tenn., Space Institute
*Drexel University	*Tennessee Technological University
*Duke University	*Texas A&M
Florida Atlantic University	*University of Texas-Arlington
Florida Institute of Technology	* University of Utah
Georgia Institute of Technology	*Vanderbilt University
University of Hawaii	*Virginia Polytechnic Institute
*University of Houston	*Washington University
*Iowa State University	University of Washington
*University of Iowa	*West Virginia University
*University of Kansas	University of Wisconsin-Madison
*Lehigh University	University of Wisconsin-Milwaukee
*Louisiana State University	*Worcester Polytechnic Institute
*University of Maryland-College Park	University of Wyoming
*Massachusetts Institute of Technology	Yale University
*Mercer University	

*Visits made through December 31

STATES REPRESENTED IN AGTSR PROGRAM

Through December 31, 1993 (33)

Alabama
Arkansas
California
Colorado
Connecticut
Delaware
Florida
Georgia
Hawaii
Indiana
Iowa
Kansas
Louisiana
Maryland
Massachusetts
Michigan
Minnesota
Missouri
New Jersey
New York
North Carolina
Ohio
Oklahoma
Pennsylvania
South Carolina
Tennessee
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