

Benefits of the AGTSR Program

William H. Day
(860-565-0086; Fax: 860-565-0213; E-mail: dayw@pweh.com)
Pratt & Whitney
400 Main Street, MS-165-22
East Hartford, CT 06108

Introduction

Good morning. My presentation is about what Pratt & Whitney perceives as the value received from the AGTSR program.

Combustion Research

Combustion is a major research concern. I have listed here the problems, the impact of universities on combustion research, and some specifics about who has actually contributed to helping solve combustion problems.

Combustion dynamics is a major combustion issue. Acoustic characteristics have plagued many people in the industry, including us. Feedback to air and fuel systems is another issue. If we can solve combustion dynamics problems, this will make a big difference in our testing costs. Penn State, Cal Tech, Georgia Tech, and Virginia Polytechnic Institute have all contributed to the development of mathematical models that helped us address this issue. The combustion dynamics issue is still not totally solved, but the work at these universities has been quite helpful to our technical experts.

Another combustion issue is NO_x emissions. The research issue is defining actual versus predicted NO_x emissions and developing analysis methods to improve the prediction accuracy. The ability to model this process would again reduce test costs as well as the emission levels themselves. University of California-Berkeley, Cornell, Penn State, and Brigham Young are contributing to this effort.

The final combustion issue we see at Pratt & Whitney is the problem of fuel composition and its effect on turbine combustors, both contaminated and natural gas, and non-standard fuels. The impact of solving that problem would be the ability to use standard fuels without expensive test programs. We need more work in this area, but the AGTSR research is a start.

Materials Research

This diagram gives you an idea of the work going on, primarily with the University of Connecticut, on the failure mechanisms for barrier coatings. We look at the bond strength, the direct pull, and then at non-destructive evaluations like laser fluorescence. The intent is to eventually evaluate the initial coat quality and find a way to predict the remaining coat life.

We are working on a model that charts bond strength and bond stress. When this work is completed, the results will be quite helpful to us in predicting the life of barrier coatings. This is also important to everybody in the industry.

Student Interns

Another benefit that Pratt & Whitney sees from the AGTSR Program, as others have commented, is people. Our interns have come to us from the State University of New York-Buffalo, Clarkson, Carnegie Mellon, Virginia Tech, Clemson, Virginia Polytechnic Institute, and Penn State. These interns have made worthwhile contributions to the technical research areas at Pratt & Whitney. We have had a positive experience with interns. We have hired new students who have worked on the AGTSR projects as regular employees. These people produce really first-class work.

Future Work

It seems to us that the AGTSR program benefits the gas turbine industry in several ways: the ATS gas turbines themselves, and beyond that, in improvements to the ATS gas turbines and also non-ATS gas turbines. This technology-based funding from DOE is helping the entire U.S. gas industry. The future program of the AGTSR should use the same approach that has been successful so far, again, because the impact of this research applies not just to the specific ATS machines, but to all machines.

And the issues are basically the same for the future as they have been. The future priorities are similar to current priorities. Again, combustion tops our list in priority. Materials priorities are also in the same general areas that are being worked on now. So my goal is not screw up a good thing. Keep it going.