

TRIBOLOGICAL LIMITATIONS IN GAS TURBINE ENGINES: A WORKSHOP TO IDENTIFY THE CHALLENGES AND SET FUTURE DIRECTIONS

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GAS TURBINE ENGINES:
A Workshop to Identify the
Challenges and Set Future Directions**

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SUMMARY

A workshop co-sponsored by NASA (Glenn Research Center), ASME (Tribology Division) and industry (Industrial Tribology Institute and Mohawk Innovative Technology) was convened to consider the tribological limitations that inhibit progress in present-day and future turbomachinery, particularly gas turbine engines. Parallel to the determination of such constraints the Workshop was to consider and evaluate a range of new technologies in the field of tribology that may eliminate or alleviate the present deficiencies. This gathering bears a close relation to the IHPTET (Integrated High Performance Turbine Engine Technology) program launched by the Government in 1988 to meet the challenges of advanced turbomachinery over the next decade and a half.

The Workshop was co-chaired by Dr. Hooshang Heshmat (Mohawk) and Dr. Christopher DellaCorte (NASA) who are both officers of ASME's Research Committee on Tribology (RCT). Represented at the Workshop were both small and large gas turbine manufacturers; the three U.S. armed services and NASA; and a number of participants from research groups and universities. The three-day meetings were attended by some 40 people and consisted of the following schedule. Presentations were delivered by participants from industry, Government agencies and research organizations. Five subgroups were then formed focused on the following specialized areas: rolling element bearings together with the required materials, lubricants and seals; magnetic bearings plus back-up systems; compliant foil bearings including required materials and coatings; modeling of bearing performance and integration into the overall system; and advanced monitoring and predictive tools to serve the present and new technologies.

The five panels evaluated the range of available innovations against the existing tribological needs and prepared a list of development programs aimed at advancing the design of high performance turbomachinery. At the plenary meeting these lists were scrutinized and discussed in order to assign to them some hierarchical order of importance. In the final session a priority list was arrived at consisting of some 20 programs deemed most important for the future of advanced turbomachinery.

LIST OF ABBREVIATIONS

AB	Auxiliary (back-up) bearings
ACM	Air cycle machines
AGT	Aircraft gas turbines
APU	Auxiliary power unit
CFD	Computational fluid dynamics
CFB	Compliant foil bearings
DN	Diameter ∞ speed (mm ∞ rpm)
DoD	Department of Defense