

aerospace engineering and engineering mechanics

GRADUATE SEMINAR

Grand Challenges in Materials

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Date: April 12, 2002

Time: 3:00 - 4:00 p.m.

Place: 755 Baldwin Hall

Refreshments: 2:45 – 3:00 p.m.

ABSTRACT

Gas turbine engines, particularly aero-turbines, are among the most complex mechanical systems in everyday use. The public that travels by air demands nothing less than ultra-high reliability of engine components, spotless safety records, and affordable airfares. In recognition of past accomplishments, the National Academy of Engineering identified the Airplane (with its associated engine) as one of the top 20 Greatest Engineering Achievements of the 20th Century and High- Performance Materials also made the list of the top 20 Greatest Engineering Achievements. The accomplishments of the past are impressive, and they were achieved through much effort on the part of many disciplines. Many advancements were spurred on by progress in materials and process engineering. As we look to the future, we expect that materials innovations will continue to contribute to driving aero-turbines to even greater heights of achievement. This paper will highlight five Grand Challenges in materials that lay the foundation for opportunities to enable significant further improvement in aero-turbine technology.

BIOGRAPHICAL SKETCH

Robert E. Schafrik is the General Manager of the Materials and Process Engineering Department at GE Aircraft Engines. He is responsible for developing advanced materials and processes used in GE's aeronautical turbine engines and their marine and industrial derivatives. He oversees Materials Application Engineering activities supporting all GEAE design engineering, manufacturing, and field support activities. He also operates a state-of-the-art in-house laboratory for advanced materials development, characterization, and failure analysis. Prior to joining GE in November 1997, he served on the National Research Council (the operating arm of the National Academy of Sciences) and the National Academy of Engineering as Director of the National Materials Advisory Board and Director of the Board on Manufacturing and Engineering Design. From 1968 to 1988, he served in the U.S. Air Force in a variety of capacities. He retired in 1988 as a Lieutenant Colonel. Dr. Schafrik holds a Ph.D. in Metallurgical Engineering from The Ohio State University, M.S. degrees in Information Systems from George Mason University and in Aerospace Engineering from the Air Force Institute of Technology, and a B.S. degree in Metallurgy from Case-Western Reserve University.