

The Department of Mechanical Engineering/College of Engineering and Applied Sciences  
Stony Brook University

## Mechanical Engineering Seminar



### **Timothy Jacobs, PhD**

Assistant Professor  
Texas A&M University  
College Station, Texas

### **Lecture Title: Fuels and Advanced Combustion: The Future of Internal Combustion Engines**

Friday, November 18, 2011, 2PM, Room 173 Light Engineering

#### **Abstract**

The transportation industry is in a state of flux, and we seem to be experiencing a paradigm shift as advanced powertrain concepts become reality in our marketplace. Driven by increasing needs to ensure environmental quality, an impending need to reduce carbon emission, and knowledge that improved efficiency is the most immediate and available “source of energy”, there might be a perception that internal combustion engines are inferior technology. Such engines themselves, however, are undergoing a paradigm shift driven by increasing knowledge that their current state-of-the-art is far short of its maximum potential. Simply, internal combustion engines have much more improvement in efficiency to offer than what they are currently designed for.

This presentation will explore such opportunities to improvement in internal combustion efficiency. Specifically, and in the near term, there are two major technology developments that are manifesting such improvements: biofuels and advanced combustion. Direct replacement of petroleum diesel with biodiesel and the implementation of low-NO<sub>x</sub> / low-soot low temperature combustion in diesel engines combine to offer improvements in engine efficiency and lower net carbon emission. Research questions surrounding both technologies, however, fervently remain and opportunities for collaboration among control engineers, material engineers, catalysis engineers, fuel engineers, and other key disciplines is needed to realize the internal combustion engine’s full and true efficiency potential. Realizing the paradigm shift has occurred in the broader sense of energy conversion, the presentation will conclude with new approaches to teach the first course on thermodynamics, enabling the Next Generation Engineer to be well-equipped to develop and design future energy technology.

#### **Biography**

Dr. Timothy Jacobs is an assistant professor at Texas A&M University, College Station, Texas. His research interests lie in the general area of energy conversion with specific emphasis on internal combustion engines, alternative fuels, and emissions reductions. His teaching interests include thermodynamics and internal combustion engines. He received his PhD in 2005 from the University of Michigan.

