



## ME Department Seminar

### *Some observations about knock in spark ignition engines;*



#### **Jaal Gandhi**

Grainger Professor of Sustainable Energy and the  
Chairman of the Department of Mechanical Engineering.

**Tuesday, September 27, 2016**

**4:00 p.m.**

**1200 EECS**

#### **Abstract:**

Spark ignition engines have many excellent attributes. They are reliable, quiet, have excellent air utilization, and with catalytic aftertreatment are extremely clean. Their major drawback, however, is a limit on their efficiency imposed by engine knock – an uncontrolled autoignition of the end gas ahead of the flame front that can lead to significant engine damage. The time of knock occurrence can be predicted quite well, but the severity of knock on a given cycle has eluded prediction. In this presentation, we will discuss the statistical nature of engine knock, and the repercussions this has on the prediction of knock intensity. A model will be put forth to physically explain the limit behavior. Finally, the problem of accurately measuring knock intensity will be discussed. A set of experiments with multiple pressure transducers will be discussed along with the inherent problems that the impulsive pressure rise associated with knock imposes on pressure measurements. From this, further insights into the nature autoignition process can be uncovered.

#### **Bio:**

Professor Jaal Gandhi received his PhD from Princeton University in 1995 and has been on the faculty at the University of Wisconsin-Madison since that time. He is currently the Grainger Professor of Sustainable Energy and the Chairman of the Department of Mechanical Engineering. Professor Gandhi's research is focused on understanding turbulent mixing and combustion in internal combustion engines. He has published widely in this field, covering spark- and compression-ignition engines and the application of optical diagnostics to investigate in-cylinder phenomena. Professor Gandhi has been recognized as a Fellow of the Society of Automotive Engineers and the American Society of Mechanical Engineers for his contributions. Since 1999 Professor Gandhi has served as Director of the Wisconsin Small Engine Consortium (WSEC).