

- 1. Research Title:** Compact Rugged Non-Intrusive Stress Measurement System (NSMS)
- 2. Individual Sponsor:**
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- 3. Academic Area/Field and Education Level**
Mechanical, Aerospace, or Electrical Engineering (MS or PhD level)
- 4. Objectives:** Assess modern state of the art NSMS technology, develop a concept of miniaturizing and ruggedizing NSMS to use onboard aircraft
- 5. Description:** NSMS is commonly used for ground testing turbine engine turbomachinery, mainly by sensing passing blades that disrupt laser signals, with disruptions in blade tip timing indicating airfoil deflections due to vibration. This type of testing is vital for assessing engine reliability and airworthiness. The equipment is typically too large to be practical for in-flight testing that exposes aircraft components to the real operating environment. The intent of this project is to survey historical and current tip timing methods, as well as sensing schemes and processing electronics to investigate the feasibility of designing and building a compact and sufficiently rugged NSMS suitable for flight testing. If successful this technology offers advantages for accelerating engine development, especially for modular unmanned engine products. A NSMS test rig is available at AFRL's Compressor Research Facility (CRF) to conduct experiments for evaluating concepts.
- 6. Research Classification/Restrictions:** Open to U.S. citizens only. Some aspects of this research may include ITAR restrictions.
- 7. Eligible Research Institutions:** DAGSI universities

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