

# AIAD Project 7600

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# AGENDA

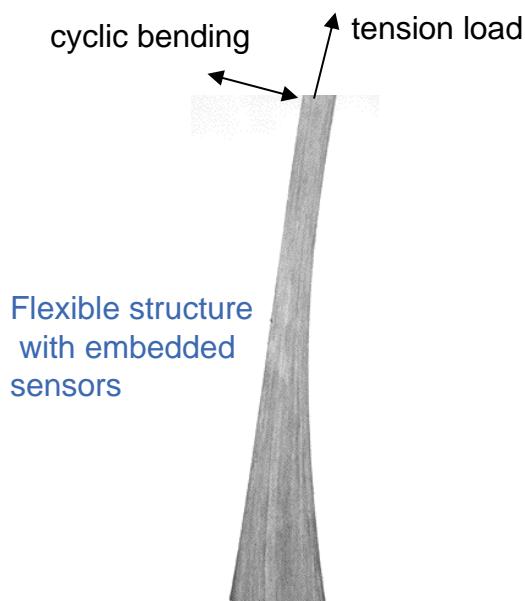
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- Background
- Fatigue Testing
- Stress Testing
- Actuators
- Project Purpose
- Embedding Tests
- Results
- Questions

# BACKGROUND: STRESS AND FATIGUE TESTS

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- Laminant and Macro Fiber Composites



"As the use of fiber reinforced materials in primary aircraft structures increases, the damage tolerance of such materials becomes increasingly important. The most common failure mechanism in laminated composites is delamination. Thus, the ability to predict delamination behavior is important for establishing static and dynamic damage tolerance criteria."

- Roderick H. Martin, and Gretchen B. Murri, *Characterization of Mode I and Mode II Delamination Growth and Thresholds in Graphite/Peek Composites*, NASA Technical Memorandum 100577, (1988).

# FATIGUE

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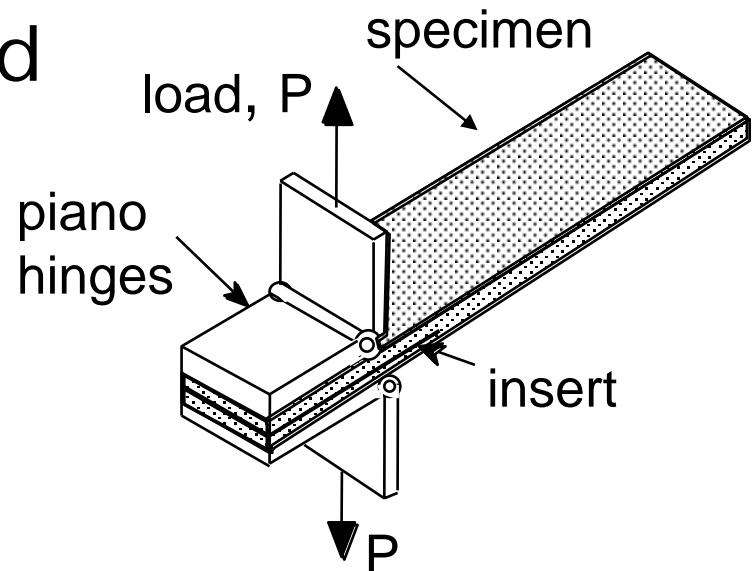
- Laminar materials
- Lifetime prediction



# STRESS

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- 3 Modes of stress
  - Mode I: Cracking
  - Mode II: Shearing
  - Mode III: Tearing
- Double Cantilevered Beam Test



# BACKGROUND: ACTUATORS

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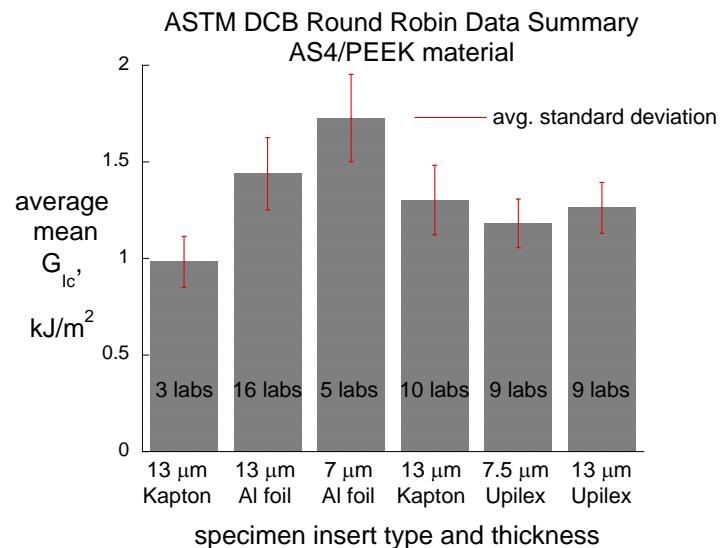
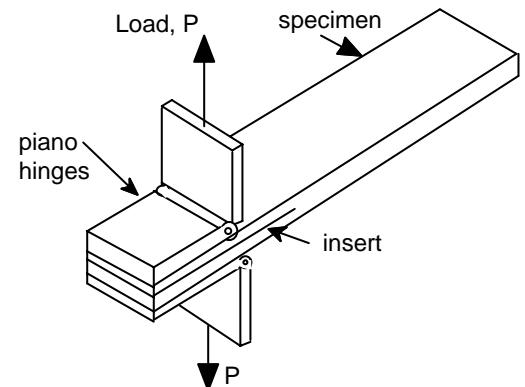
- Piezoelectric actuators
- Measure stress on outside of fatigue and stress tests
- Uses
  - Dampening
  - Tail buffet alleviation experiment
  - Smart rigidizable structures
  - Measurements for fatigue and stress testing

# PROJECT PURPOSE

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- Quantify the effects of embedding actuators in well-catalogued material

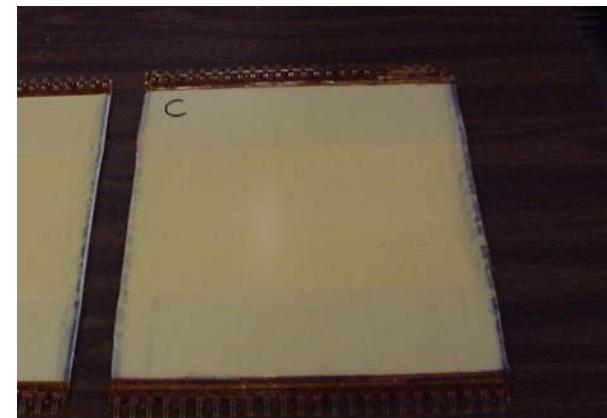
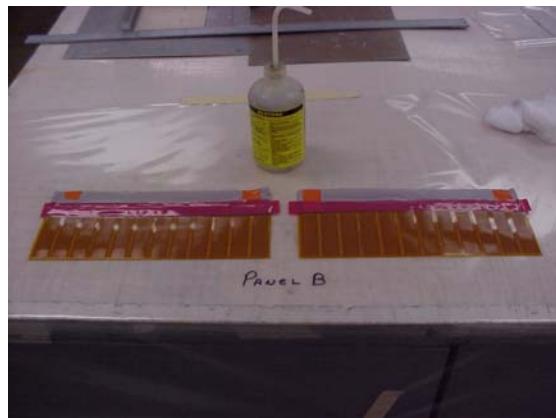
Double-cantilevered  
Beam Test (DCB) --  
ASTM Standard 5228 (static)  
ASTM Standard 6115 (fatigue)  
ISO Standard 15024 (static)



# EMBEDDED MODE 1 TEST

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- 3 types of embedding adhesives used
- Tested IAW *Mode I Interlaminar Fracture Toughness of Composite Materials, NASA Technical Memorandum 104222, (1992)*



# QUESTIONS?

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