

FAA Centers of Excellence – The Next 5 Years

FAA Engine and Propeller Directorate

November 6, 2003

Jorge A. Fernandez



***Cradle to Grave approach toward
safety-pareto driven research***



Major Research Areas

- ◆ Fuels
- ◆ Probabilistic DT Design Tools
- ◆ Icing
- ◆ Non-Destructive Inspection
- ◆ Containment Modeling
- ◆ Software and Digital Systems

Major Research Areas

- ◆ Fuels – 1990 Clean Air Act banned Tetraethyl Lead in all piston engine fuels. Since lead provides the octane required by high performance aircraft piston engines, the FAA must take the lead in developing an unleaded high octane aviation gasoline to replace the current leaded fuels.
- ◆ Risks – Alternative fuels such as Ethanol and blends can bring new problems.

Major Research Areas

- ◆ Probabilistic DT – Seek to improve Airworthiness Certification Standards for aircraft turbine engines by improving structural integrity and durability of failure of critical rotating components. Provide analytical design tool to augment current safe life design and lifing methodology.
- ◆ Risks – Human Factors issues related to inspection

Major Research Areas

- ◆ Icing - Improve aviation safety by developing technologies, requirements, technical information, procedures, and practices that reduce the likelihood of aircraft accidents in icing conditions.
- ◆ Risks – More dependent on analytical modeling plus bench tests. Looking at mixing ice accretion models with different cycling decks (system models aimed at specific engine areas)

Major Research Areas

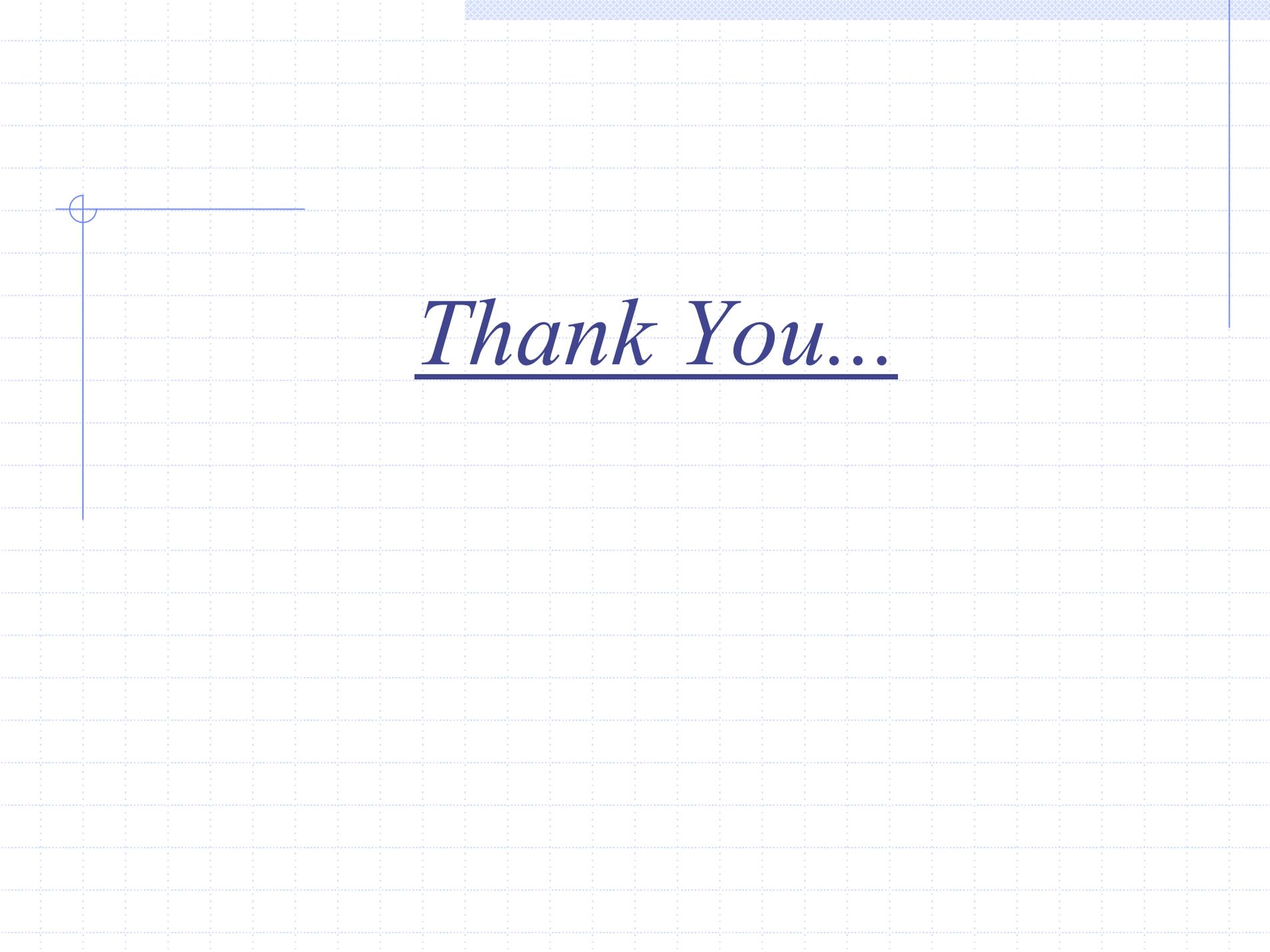
- ◆ Non-Destructive Inspection – develop advisory material as well as inspection standards for manufacturing and in-service inspections of non-rotating, safety critical components of engines with special emphasis on improved methods to replace existing fluorescent penetrant inspection.
- ◆ Risks – Lack of Industry process standardization, FAA cannot directly enforce methodologies, cost

Major Research Areas

- ◆ Containment Modeling – develop analytical methods and new technologies and certification criteria to increase the survivability of transport aircraft with extensive damage to the flight controls or propulsion system.
- ◆ Risks – Large frontal area engines, large mass and inertias

Major Research Areas

- ◆ Software and Digital Systems - to maintain or improve aircraft safety by conducting research in the area of advanced digital (software-based and programmable logic-based) airborne systems technology.
- ◆ Risks – Engine controls with outdated software before first delivery; COTS parts not capable of meeting MIL SPEC environmental tolerances (e.g. temperature).



Thank You...