



**Federal Aviation  
Administration**

# 2006 Composite Damage Tolerant Workshop

Thoughts on Thursday Afternoon  
Sessions:

- ✈ Substantiation of Maintenance Inspection and Repair Methods
- ✈ Damage/Defect Types and Inspection Technology

By: David Swartz

## Substantiation of Maintenance Inspection and Repair Methods

- ✈ Most of the Issues that we have today are that same as those we had 20 years ago.
  - Materials availability
  - Repair techniques
  - Tooling
  - Legalities Approval issues
- ✈ What Standards will MRO Industry Need to meet to repair “Next Generation aircraft”
- ✈ Need Accredited and OEM Sanctioned Engineering tools and Training programs that will facilitate composite structure.
- ✈ Need to address Data.
- ✈ **MRO will need to undergo paradigm shift to one that is more reliant on OEM support.**



## Substantiation of Maintenance Inspection and Repair Methods

- ✍ Fundamental industry trends driven by economic issues are changing the way composite airplanes are maintained.
  - Loss of trained personnel
  - Increased outsourcing
  - Companies that receive the outsourcing are facing challenges
- ✍ Great examples of the types of real world repairs.
- ✍ Live and Die by the SRM
  
- ✍ OEM Perspectives:
- ✍ Sprint:
  - ✍ Emphasized the need to design the repair around the facilities and training environment that it will be applied in.
  - ✍ Good example of customized test programs that are flexible enough to accommodate the situation.
  - ✍ Need to Repair Other than OEM Substrate.
  - ✍ Tiger team approach to application of large high performance repairs.
  - ✍ Important to do Proof of Concept.



## Substantiation of Maintenance Inspection and Repair Methods

- ✈ Airbus perspective
- ✈ We have a lot of data:
  - 20 years and 60 million flight hours
- ✈ IATA Survey of damage causes.
- ✈ Fuselage maintenance is less than 5% of structural maintenance cost
- ✈ Fuselage is majority of repairs, mostly on skin
- ✈ NDT inspection is potentially needed in case of visible surface damage to assess damage state.



# Damage/Defect Types and Inspection Technology

## ✈️ FAA research for composites

- New standard for NDI of composites have been developed
- Tap testing is not practical above about 9 plies
- New technology evaluation, CATT, Aircoupled ultrasonics Gen-Scan thermosonics etc

## ✈️ Damage/Defect Types and Inspections – Some Regulatory Concerns

- Concern over large secondary structure and damage events
- Concern over reliability of BVID Inspections and the potential consequences of missing indications.
- How important is Colour Finish
- Is preload on structure at time of impact affecting damage visibility
- Encourage a blame free culture
- Secondary bonding, Do we still need redundancy how much.



# Damage/Defect Types and Inspection Technology

- ✈ Unified Treatment of Impact Probabilistic & Deterministic
  - Approach is to use a probabilistic approach to determine a deterministic design criteria based on threat.
  - Bird strike data is largely available, hail strike data set is less robust (Some NOAA Data is available)

