



Cessna Perspective on Material and Process Controls for Bonded Repairs

2007 FAA/EASA/Industry Composite Damage Tolerance and Maintenance Workshop

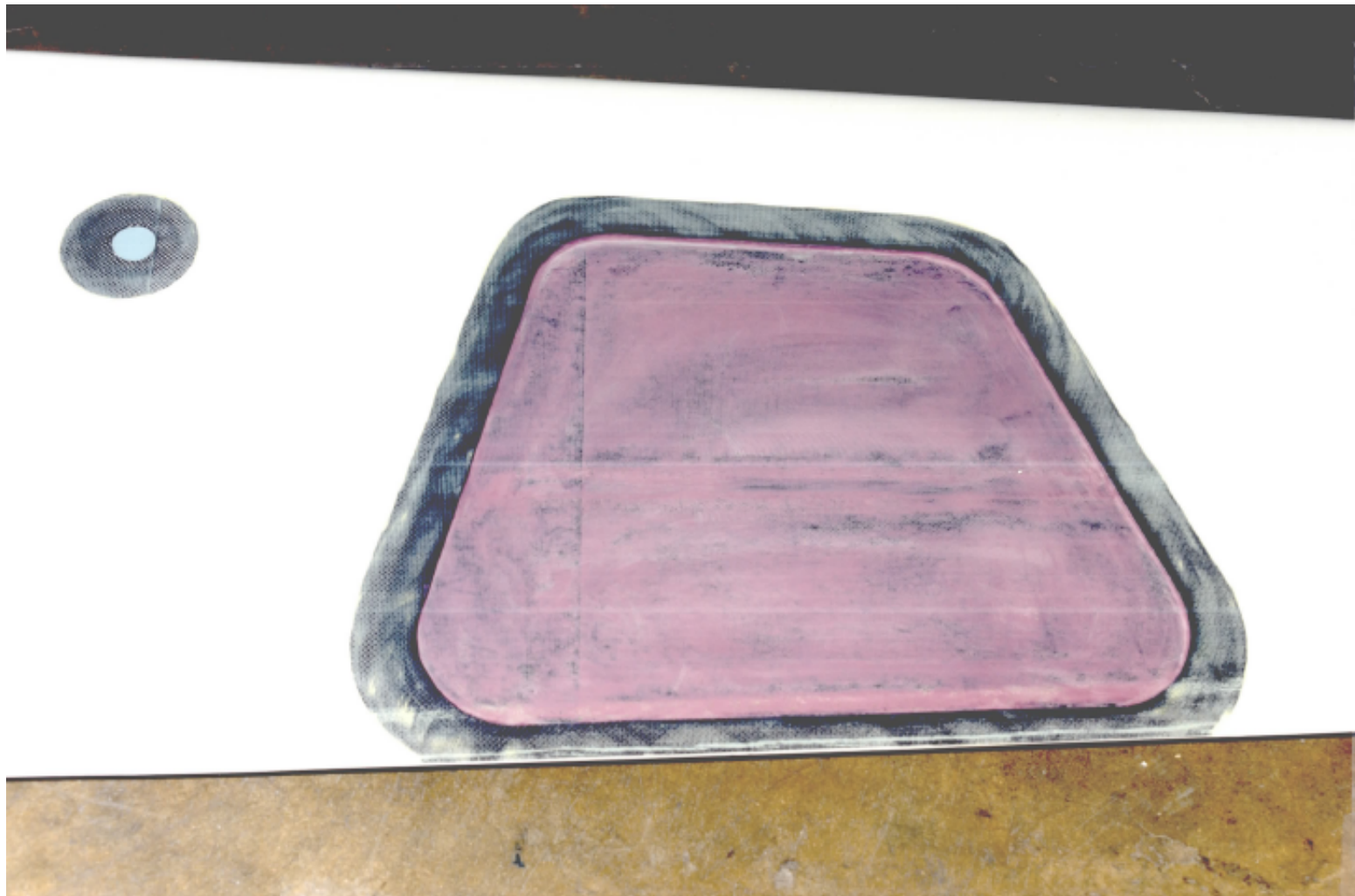
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Discussion Points

- **Damage Repairs and Substantiation**
- **General Repair Philosophy**
- **OEM Bonding**
- **Closing Comments**

Damage Repairs and Substantiation

Composite Flap



Damage Repairs and Substantiation Composite Flap



Damage Repairs and Substantiation

Metal Bond

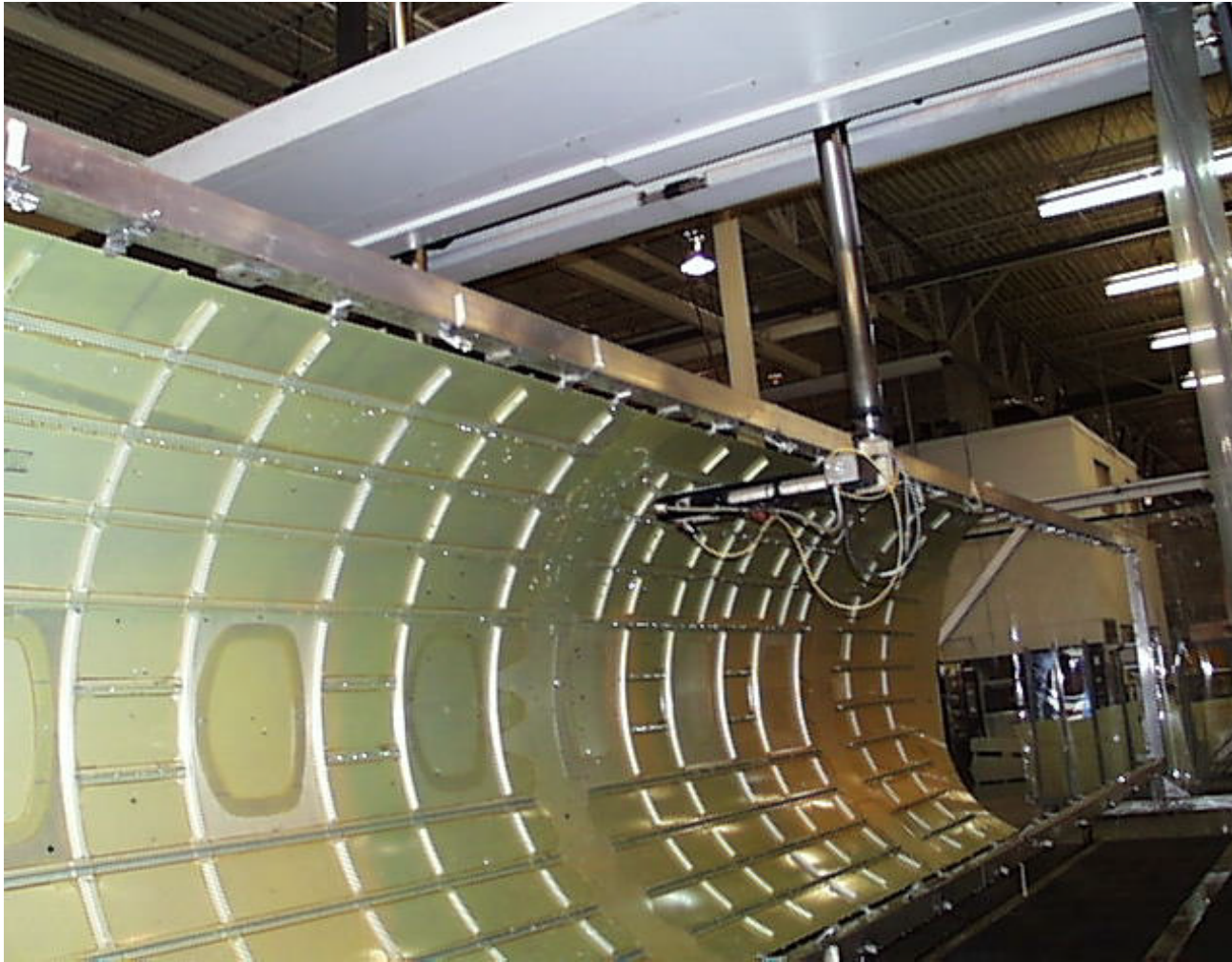


Damage Repairs and Substantiation

Metal Bond



Typical Metal Bond Fuselage Structure



Damage Repairs and Substantiation

Metal Bond



General Repair Philosophy

- **Structural integrity of bonded repairs dependent upon process controls**
- **Process controls are challenging to implement in GA repair environment**
- **Damage assessment (NDI) is critical**
- **Repair method definition must align with the capabilities at the point of execution**

OEM Bonding

Risk Mitigation

- **Process Control Mentality**
 - **Specification adherence**
 - **In process monitoring**
 - **Personnel training and qualification**
 - **NDI**
 - **Initial assembly qualification and subsequent requalifications**

- **Proper Facilities and Equipment**
 - **Process line design and control**
 - **Tooling design and maintenance**
 - **Autoclave design and control**



OEM Bonding

Risk Mitigation

- **Experienced and knowledgeable staff**
 - **Manufacturing and Facilities**
 - **Quality and Inspection**
 - **M&P and other Engineering**

- **Process and product improvements as a result of field experience – Lessons Learned**



OEM Bonding

Conclusions

- **Benefits outweigh the risks if properly managed**
 - **Documented and audited processes**
 - **Process control mentality**
 - **Proper facilities and equipment**
 - **Active maintenance programs**
 - **Experienced staff that understands:**
 - **How to do it**
 - **Why they are doing it**



Closing Comments

- **Overall approach to bonded field repairs is very conservative**
- **Key challenges:**
 - **Environmental and material controls**
 - **Personnel training and oversight**
 - **Batch size of "1"**
 - **Process verification**
 - **Repair verification**