

# Composite Repair Capabilities and Common Issues for Air Force Depot, Field and Supplier Locations





- **Objectives**

- **Survey Current AF Repair Capabilities**
- **Recommend Improvements to Individual Locations Based on Findings**

- **What we look at**

- **Repair areas**

- **Damage Removal Areas**
- **Layup Areas**

- **Material Storage**

- **Resin Storage**
- **Dry Fabrics**
- **Freezers**
- **Core Storage**
- **Potting Compounds**

- **Equipment (continued)**

- **Hot Bonders**
- **Ovens**
- **Autoclaves**
- **Cutting tools**
  - **Routers, band saws, diamond saws**
- **Drill bits**
- **Sanders**
- **Dust collection**
- **Air supply for Air tools**



- **Things we ask about**
  - **Processing techniques**
    - Pre-Preg Autoclave Cures or Room temp wet lay-up
    - How often are repairs done
    - Bonded repairs
      - Advanced Composites or metallic
  - **Training**
    - What Trainings have your technicians received
    - Do they receive refresher training
  - **Materials**
    - How do you order repair materials
    - Do you struggle getting TO approved materials or keeping them on hand, if you do, do you have a work around
  - **NDI**
    - Does facility NDI group have the capability and Knowledge to perform inspections on Composites

# Sample SAV (Current Capabilities)



- **Basic TO Approved materials on hand**
  - Resins, Dry fabric fiber glass, epocast potting compound, bagging film
- Router and templates available for damage removal
- Vacuum bagging capabilities
- Hot bonder and heat blankets on hand and operational



# Sample SAV (Issues)



- **No Specific Training in Advanced Composite Repair**
  - Only On the Job Training Provided
- **Dry Fabric and Processing Materials Stored Uncovered in Dirty Area**
  - Increased Risk of Contamination
- **Missing Repair Materials**
  - Core – Nomex, Metallic
    - Lighter weight materials can be critical on weight/balanced control surfaces
  - Pre-Preg Fiber Glass
    - Easier to process, more consistent results
  - No Film or Foaming adhesives
- **No freezers for storing pre-pregs, film, or foam adhesives**
- **No “clean room” facilities for lay up areas - Repairs are being completed in sheet metal shop.**
  - Without dedicated Composite layup areas, greater care must be taken to prevent contamination.
- **Unfiltered Shop Air used for composite repairs**
  - General Shop air has oils and other contaminants which inhibit bonding
- **No dedicated sanders which have been cleaned of lubricating oils**
  - Pneumatic Tools are lubricated from the factory and as regular maintenance, these lubricants can contaminate repair surfaces and inhibit bonding.
- **Existing repairs could use improvement**



# Sample SAV (Recommendations)



- **Get Training in Advanced Composite Repair**
- **Ensure Repairs are Being Performed Without Contamination from Nearby Dirty Tasks**
- **Obtain Additional Repair Materials**
  - Core
  - Prepregs
  - Film Adhesive
  - Foaming adhesive
- **Improve Material Storage Conditions**
  - Move dry fabric and processing materials into a clean area, and get a cover for the material rack
- **Obtain Dedicated Composite Tools**
  - Dedicated composite repair tools, which have been cleaned of lubricating oils
    - Sanders, Routers, Dotcos,
- **Shop Air Filtration System**



- **Improper Material Storage and Handling**
- **Hole Drilling**
- **Not aware of/ Not Understanding Processing Requirements**
- **Not taking the Time to Review, Learn or Rework Tooling**
- **Can't get TO approved materials**
  - 17% of A-10 202 Sampling are material substitutions
- **Lack of Training in Advanced Composites**
- **Incorrect/incomplete Tech Data Delivered to Suppliers**
- **Not using Clean air supply or Oil free tools for Bonded Metal repairs**

# Improper Material Storage and Handling



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Briefer: David Wrobel

**Distribution Statement A. Approved for public release; distribution is unlimited.**

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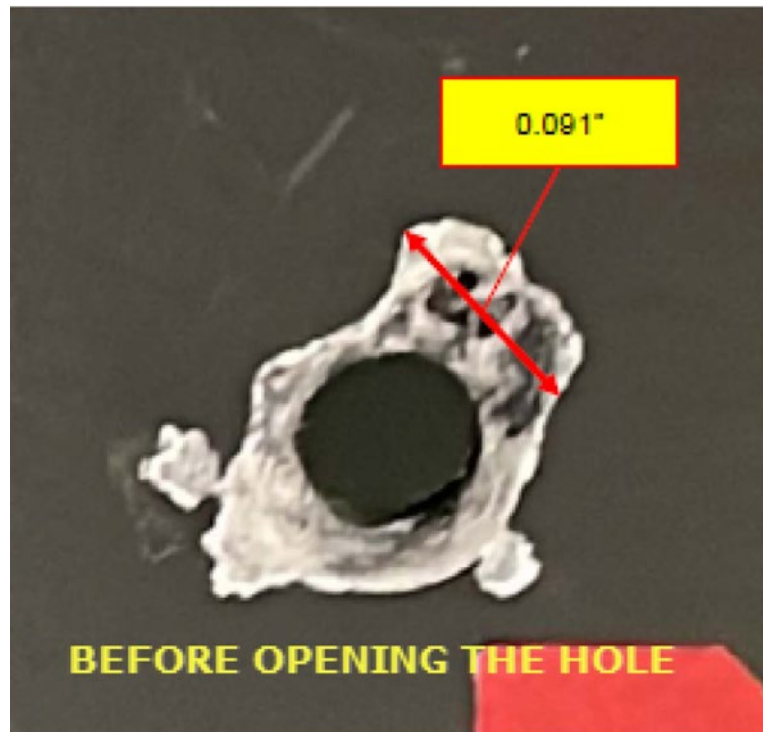
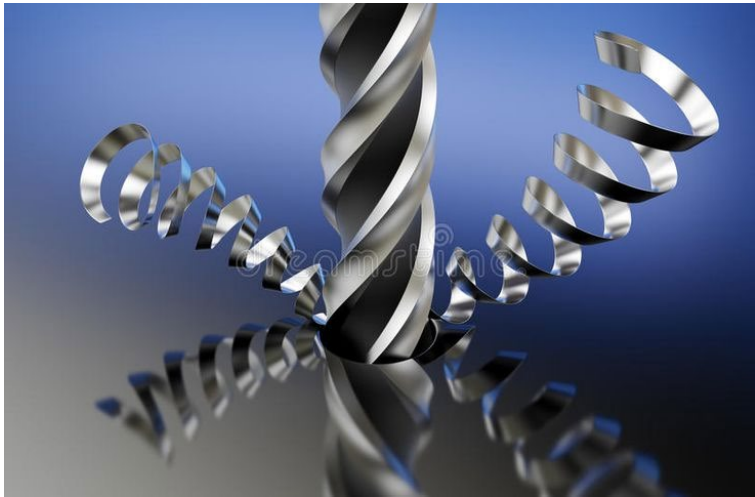
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# Drilling Holes



Delamination & Push-Out



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# Drilling Holes

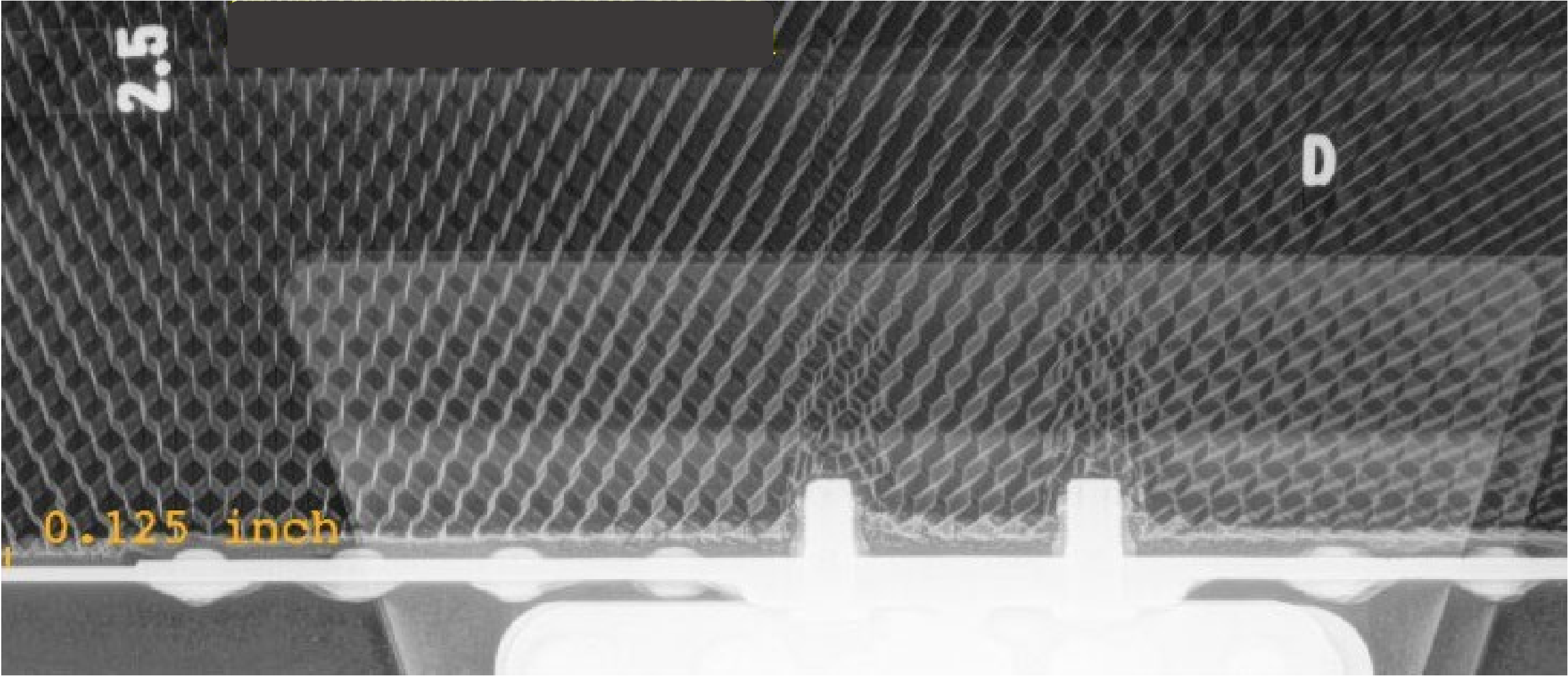


**Drill/Reamer**

**8 Facet Drill**



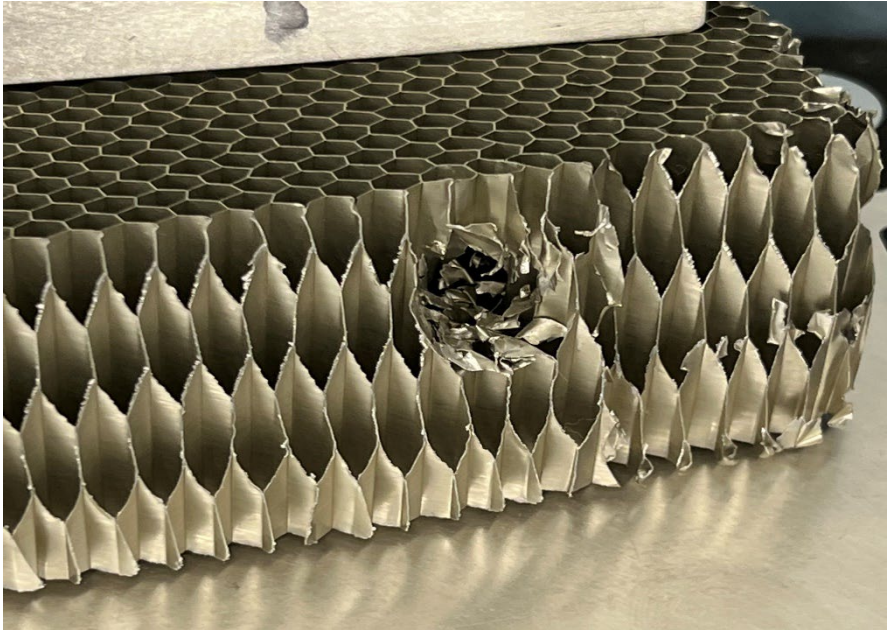
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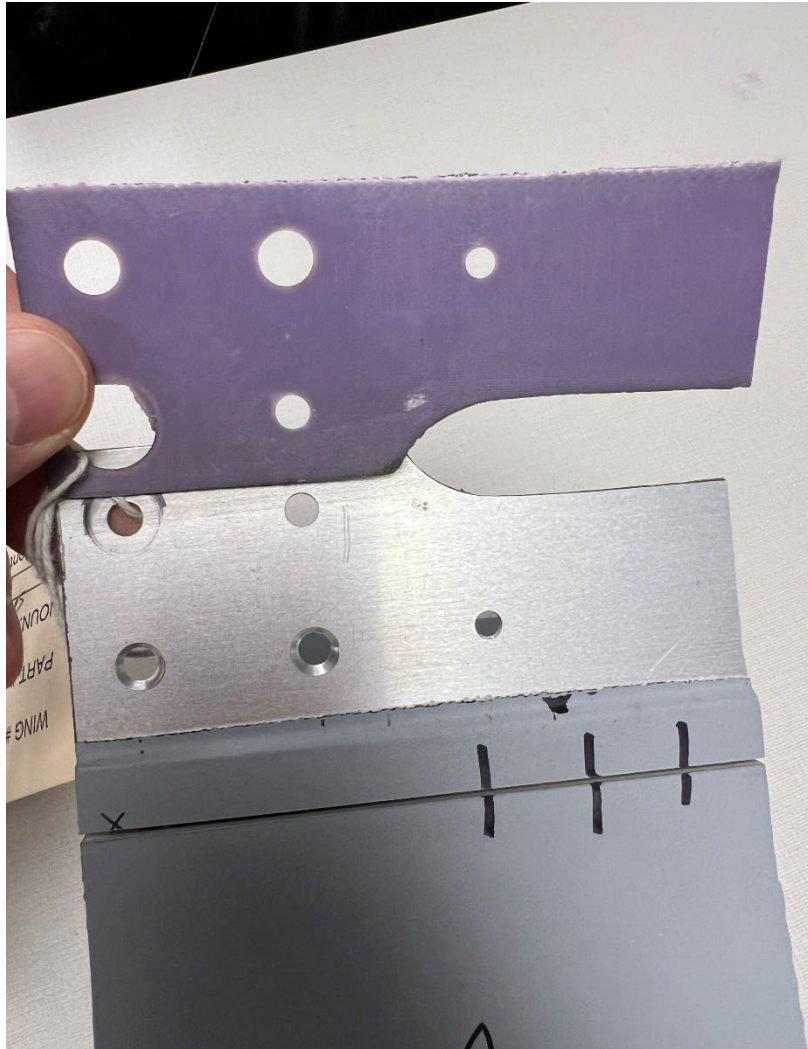
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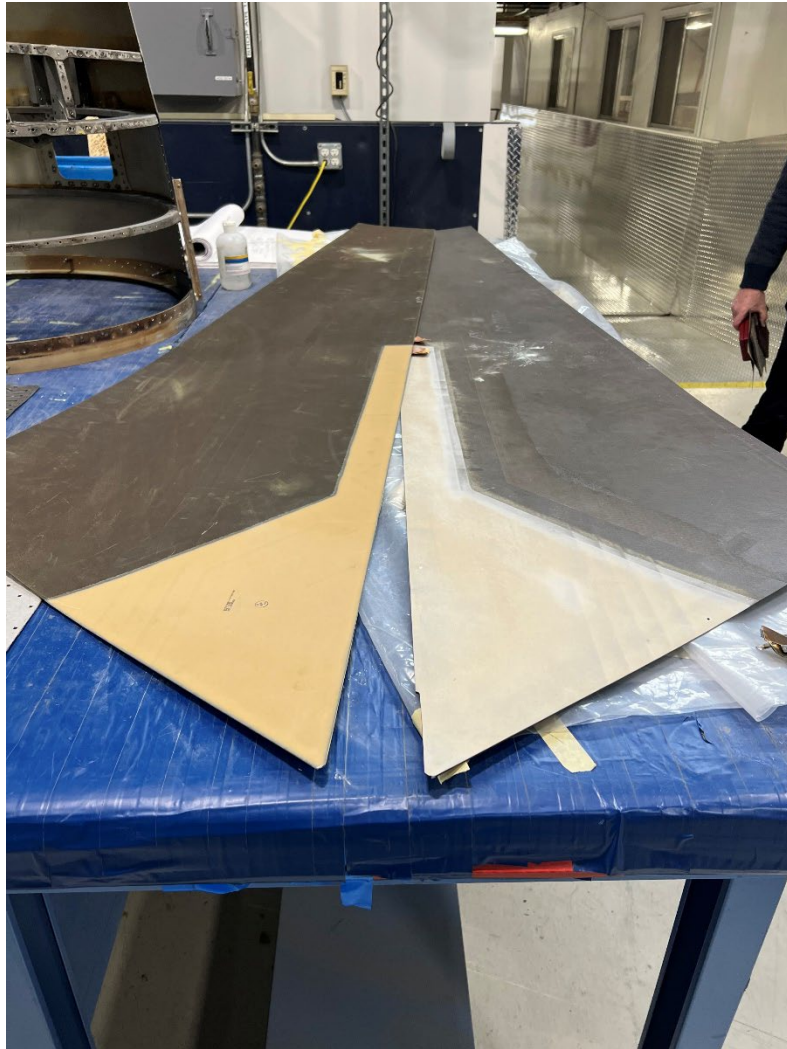
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# Not aware of/ Not Understanding Processing Requirements



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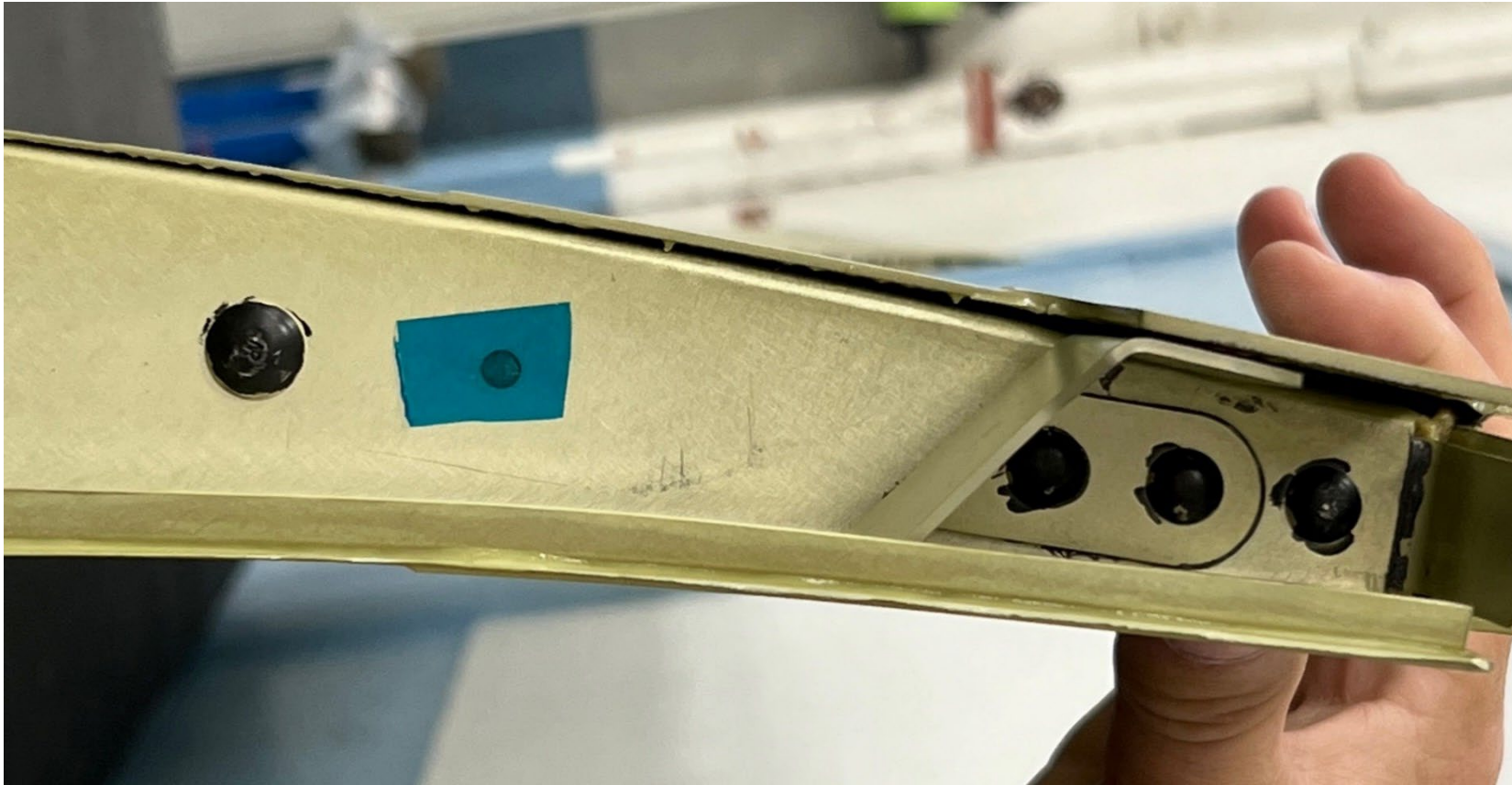
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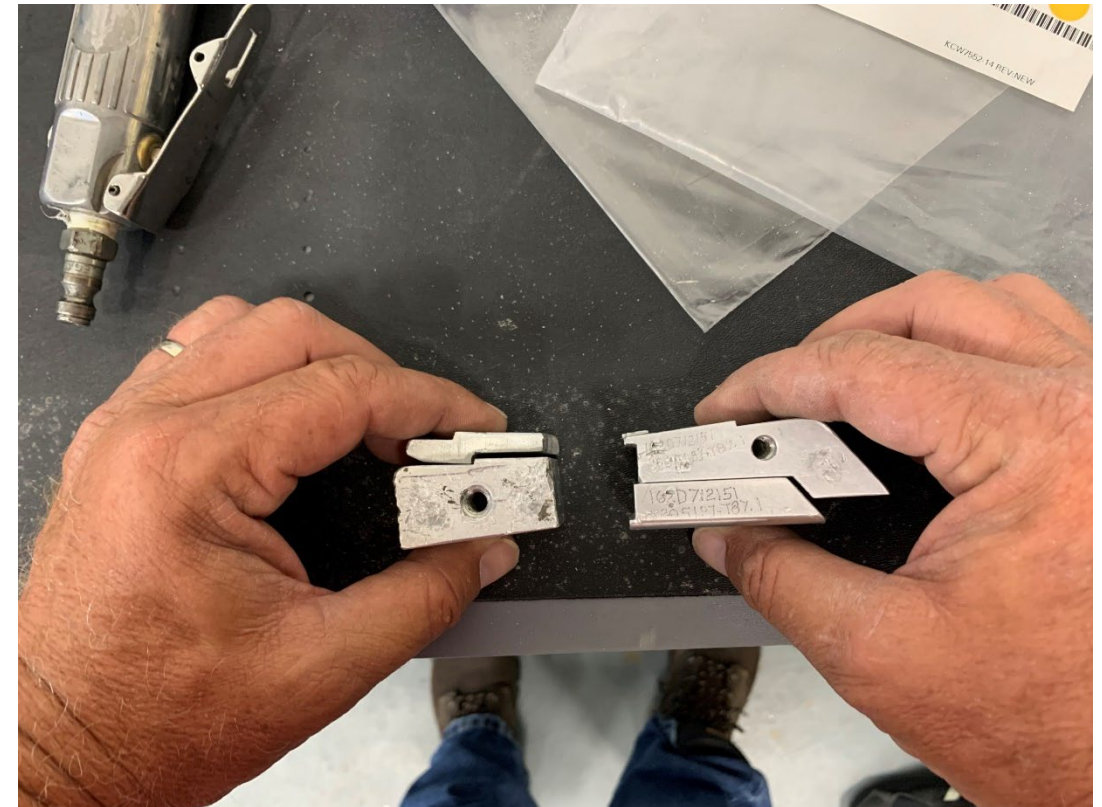
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# Not taking the Time to Review, Learn or Rework Tooling



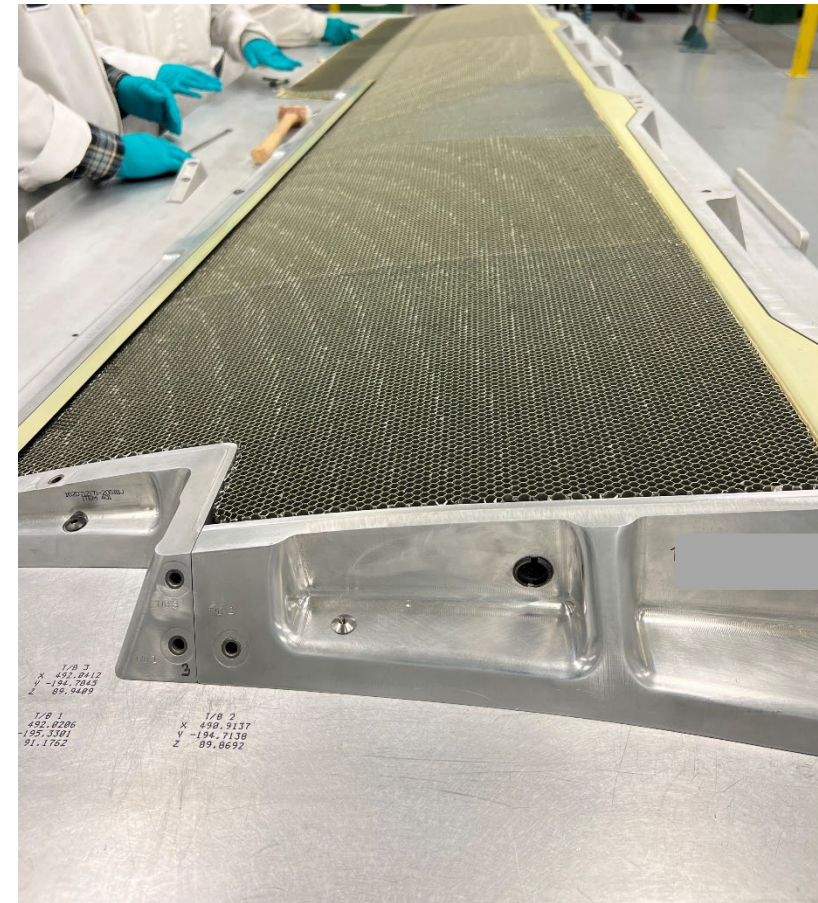
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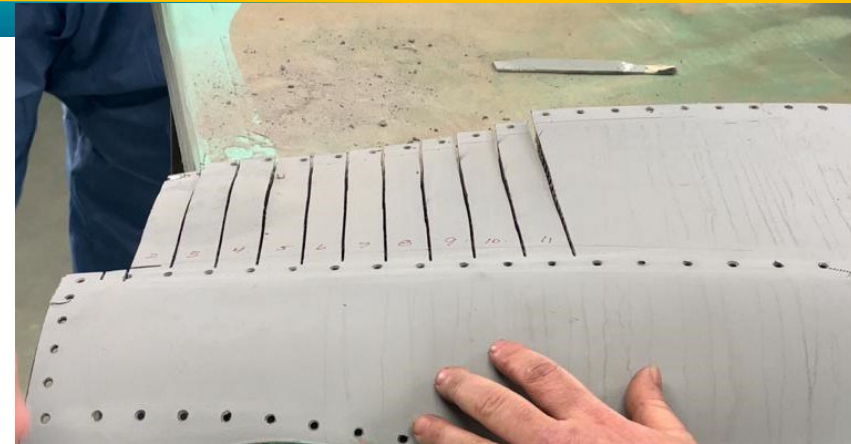
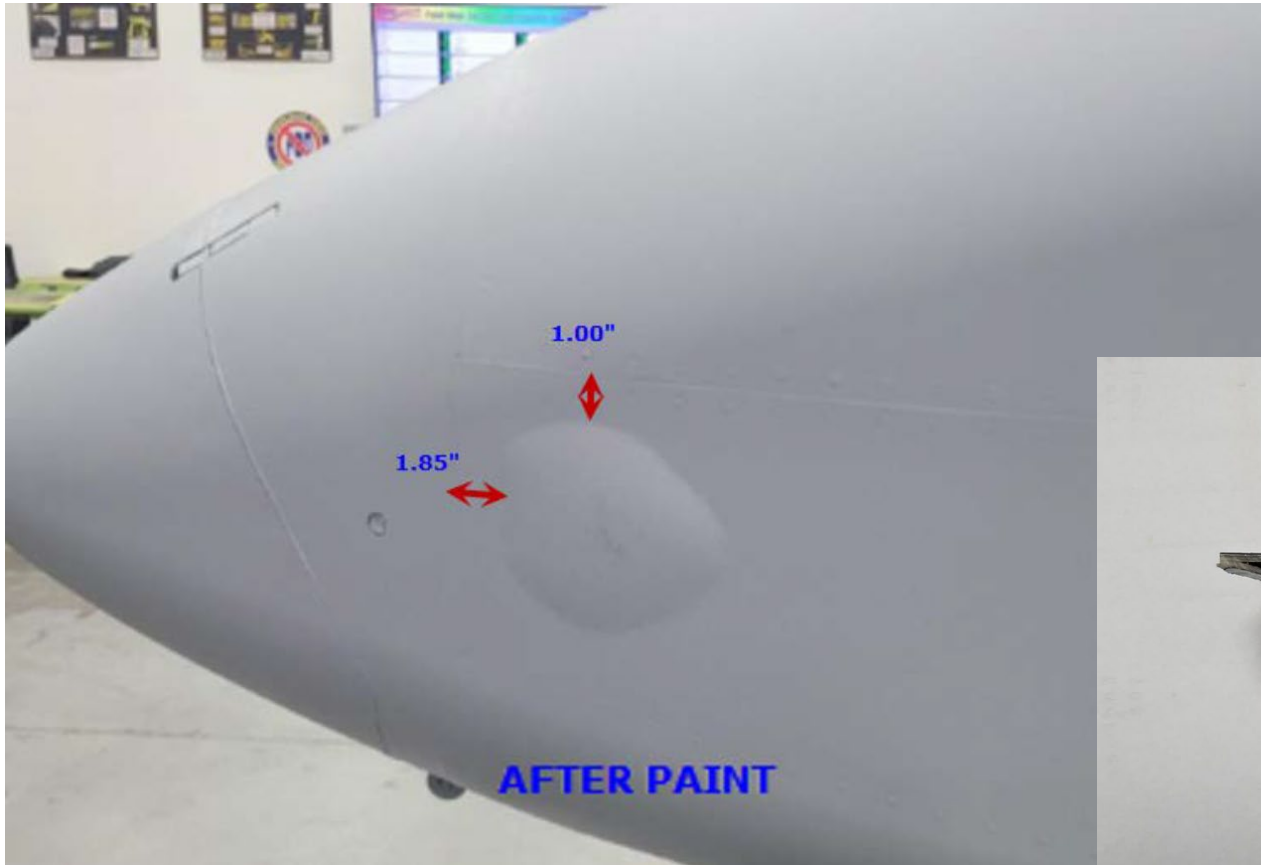
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# Not taking the Time to Review, Learn or Rework Tooling



# Lack of Training in Advanced Composites



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# Lack of Training in Advanced Composites





# Questions?



# AIR FORCE LIFE CYCLE MANAGEMENT CENTER

