



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



Briefer: David Wrobel



Site Assistance Visit Overview

- **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**



Site Assistance Visit Overview

- **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**



Common Issues

- **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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Improper Material Storage and Handling





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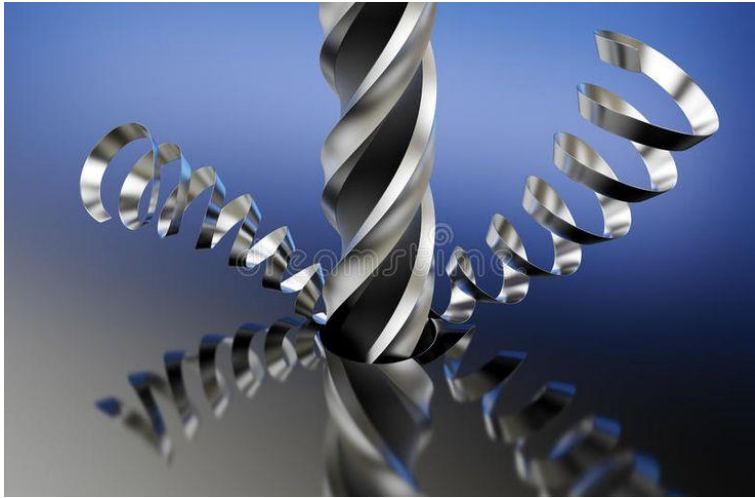
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Improper Material Storage and Handling



Drilling Holes



Delamination & Push-Out



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Drilling Holes



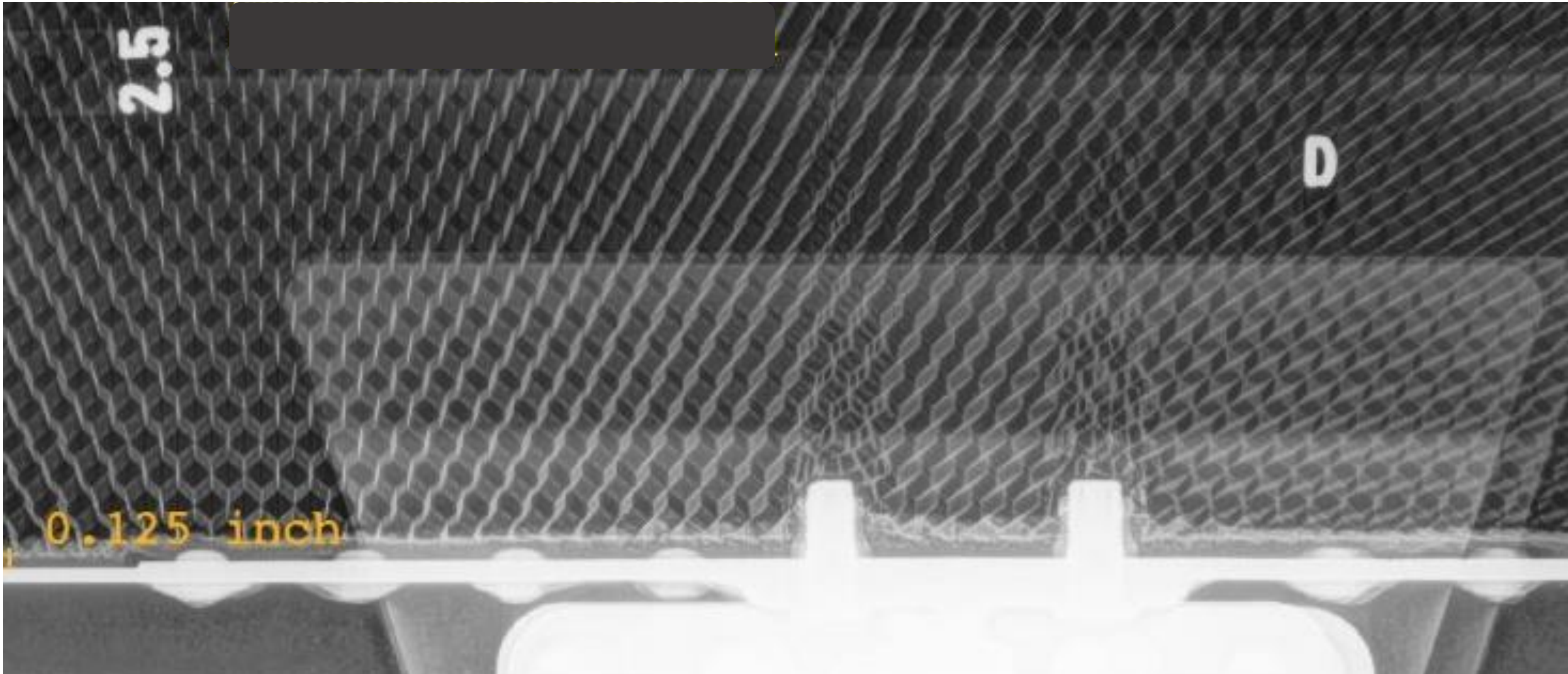
Drill/Reamer

8 Facet Drill





Drilling Holes

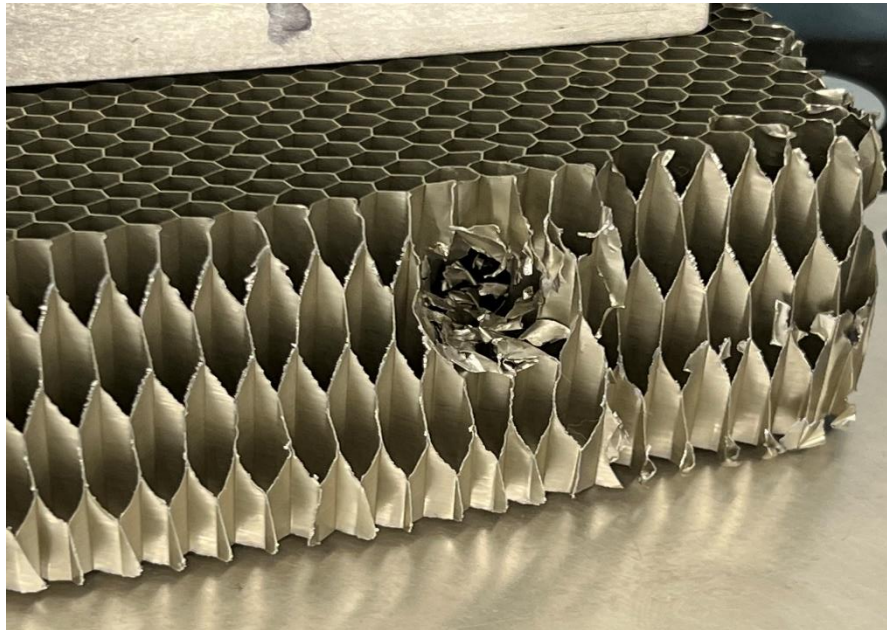


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Drilling Holes

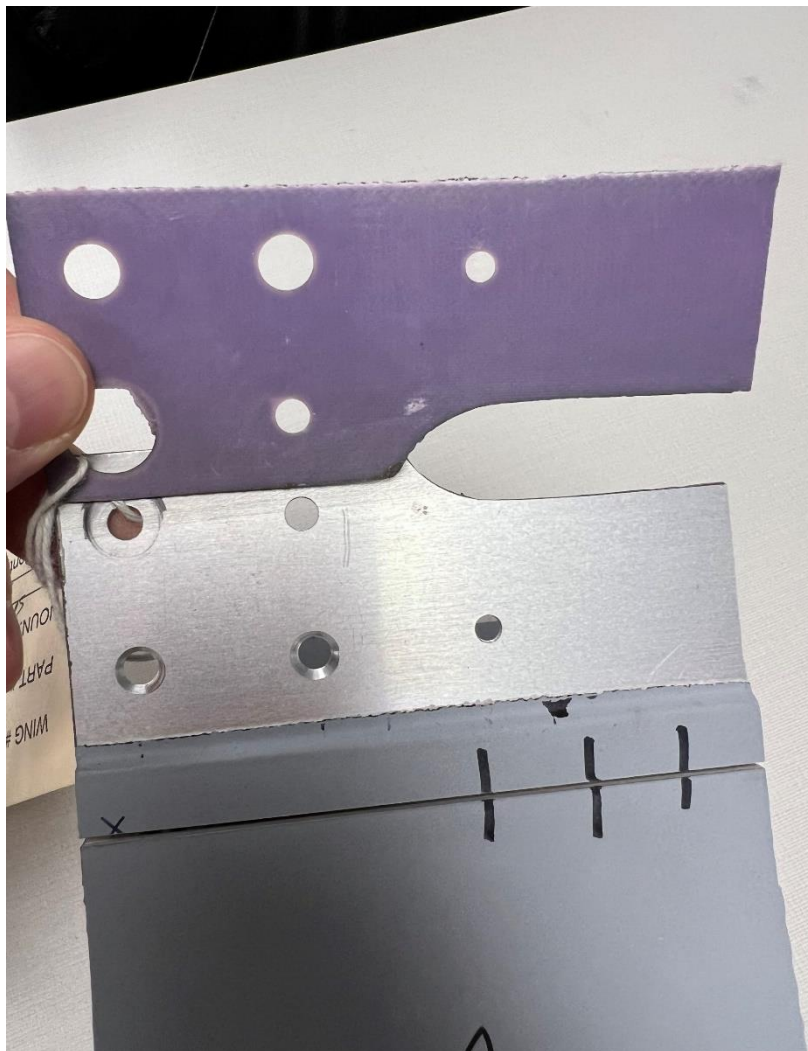
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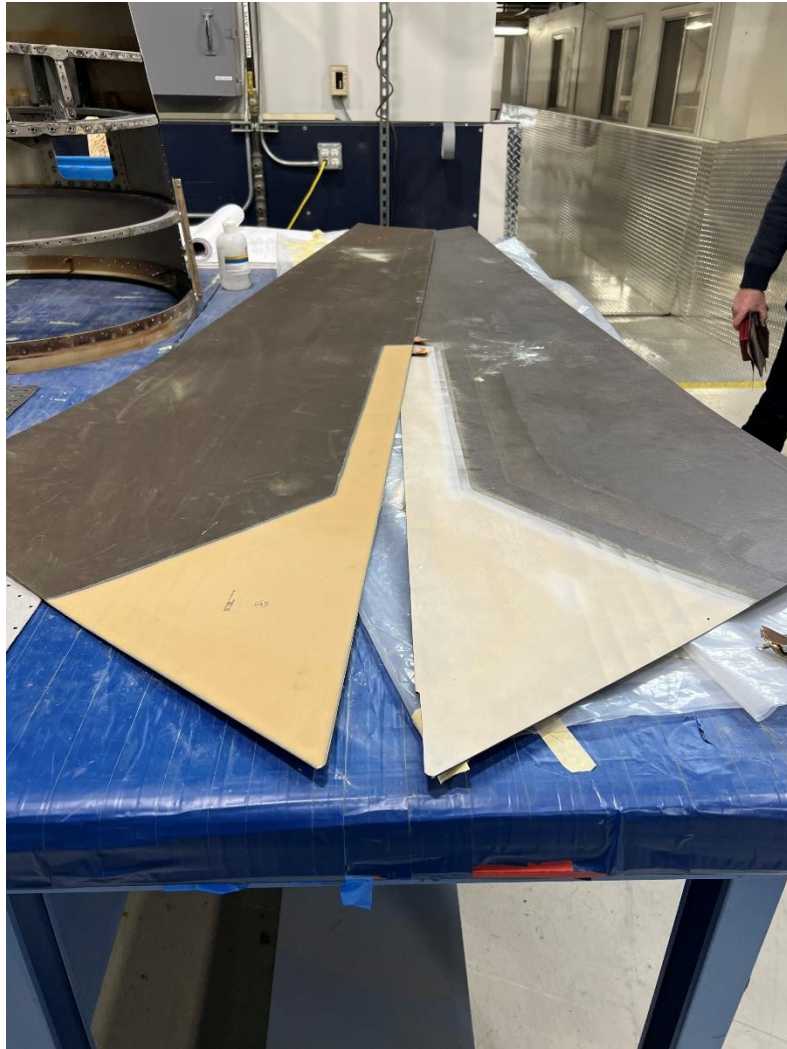
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Not aware of/ Not Understanding Processing Requirements



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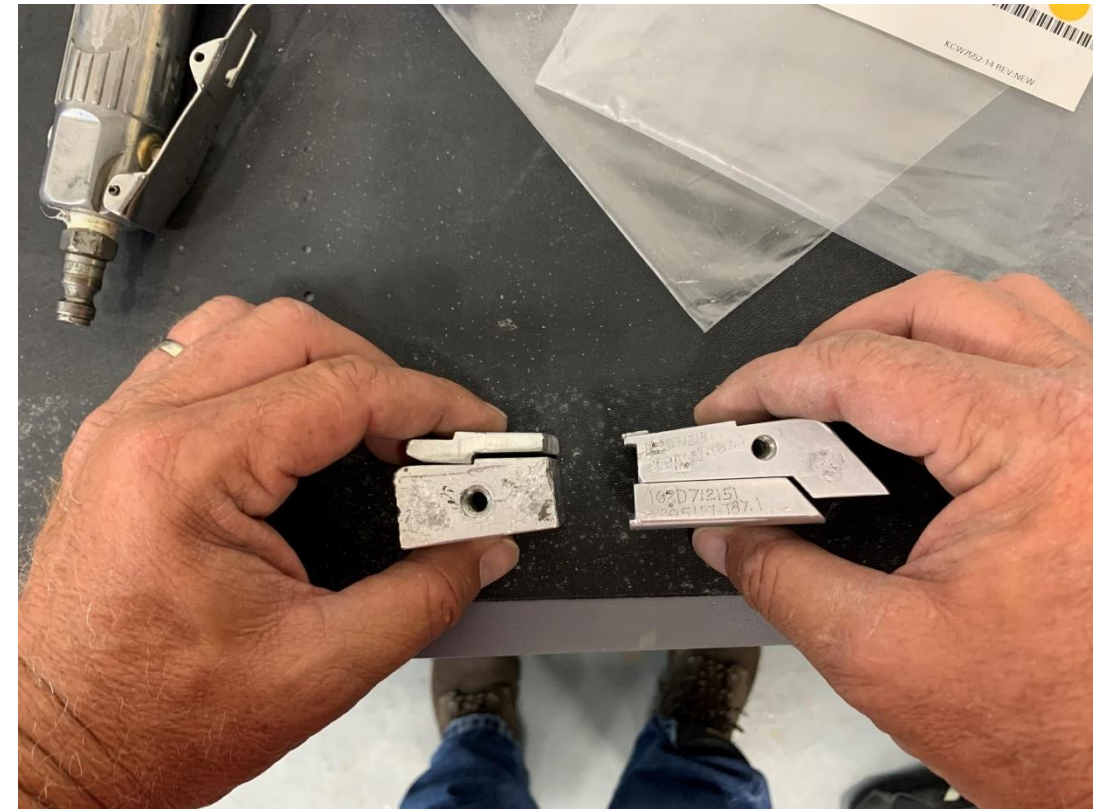
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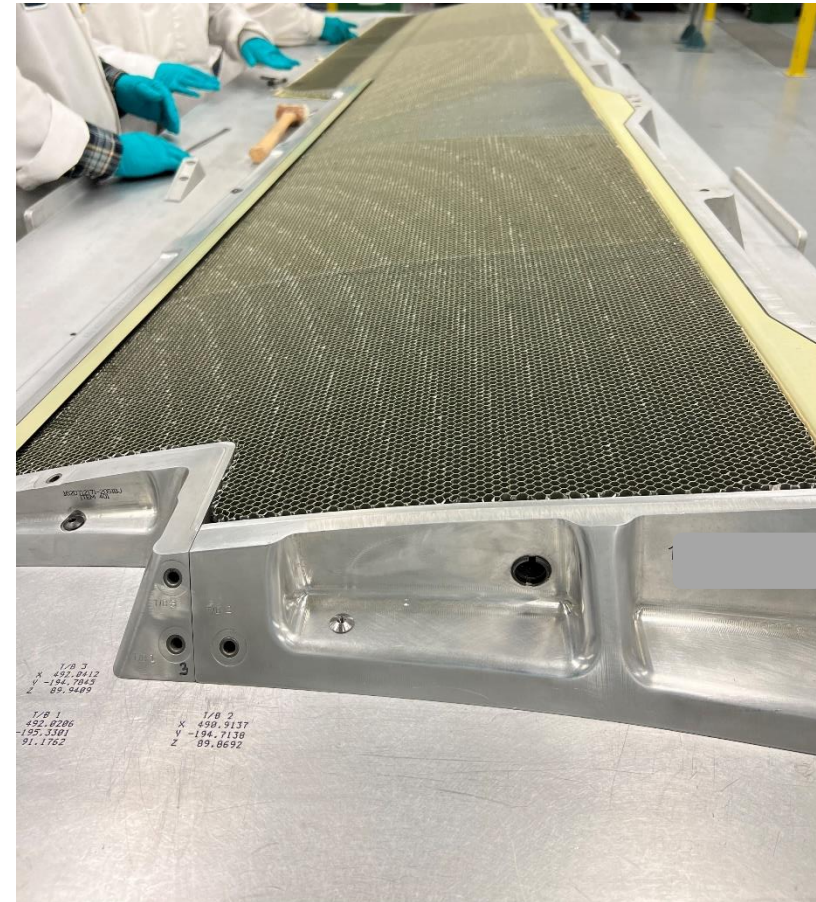
Not taking the Time to Review, Learn or Rework Tooling



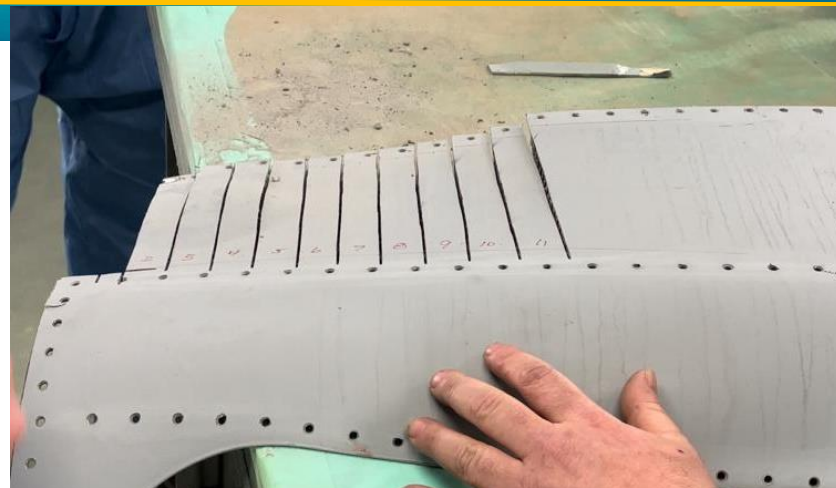
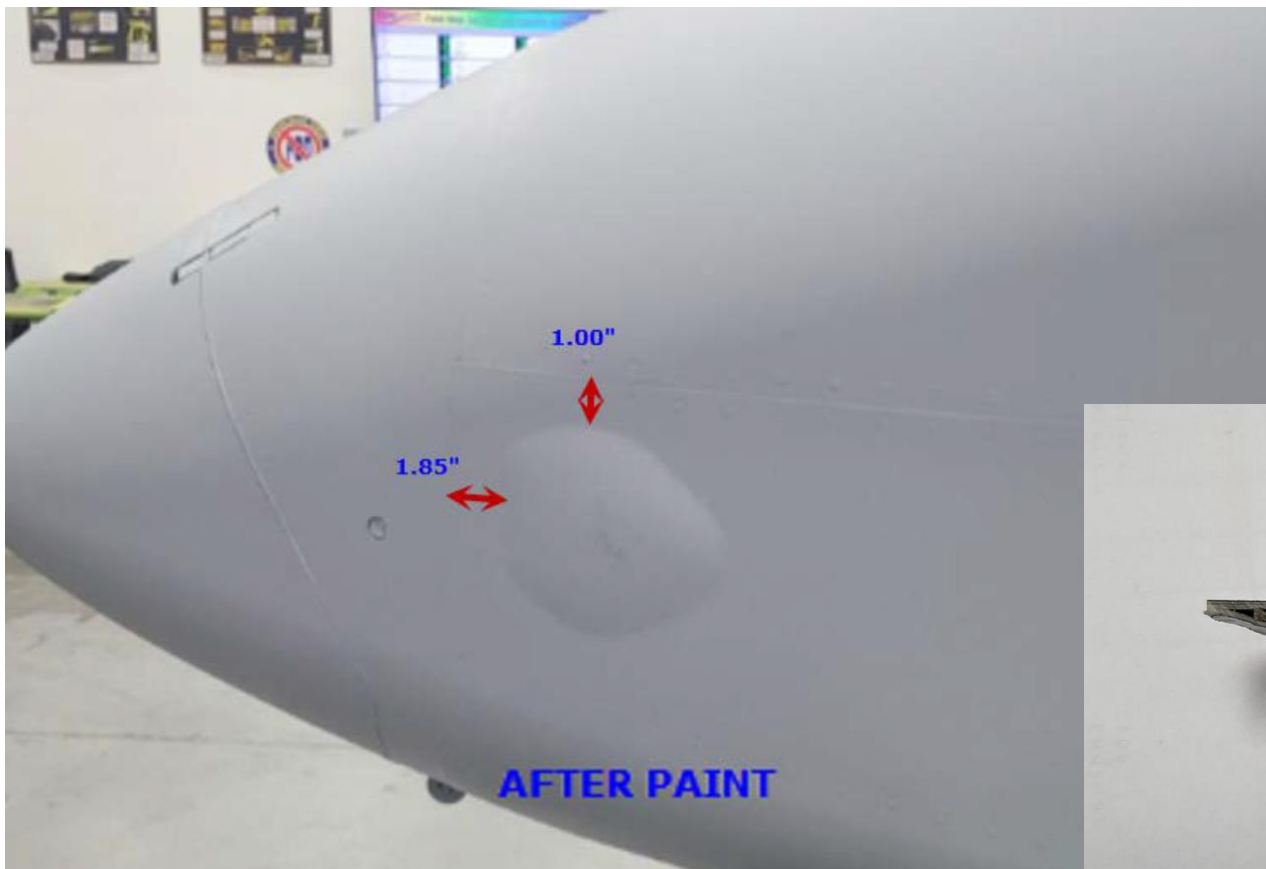
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Lack of Training in Advanced Composites



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Lack of Training in Advanced Composites





Questions?



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