



Aircraft Structural Repair Course: Sheet Metal, Composites and Damage Assessment



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Introduction:

Aircraft structural repair, covering sheet metal, composites and damage assessment, is a 5-day course for airframe structures engineering, repair shop and structures inspection staff, ending with an Airframe Damage Assessment and Repair Plan for a case damage event. Aircraft stay grounded longer, and repairs are reworked, when dents, cracks, corrosion and impact damage are measured loosely or fastener and laminate repairs drift from approved data. Nominees already inspect or repair airframe structure, and teaching is by inspection walkthrough on damaged panels, repair drawings and repair manual extracts. CoreConcept Training Center delivers this aircraft structural repair course.

Course Objectives:

- Map semi-monocoque load paths through skin, stringers, frames, bulkheads and spars and identify principal structural elements affected by damage
- Measure and classify dents, nicks, cracks, corrosion pits and composite impact damage against allowable damage limits in the structural repair manual
- Design and install riveted sheet metal repairs with correct doubler sizing, rivet alloy, edge distance, pitch and countersink depth
- Remove corrosion, blend out damage and restore surface protection on aluminium alloy structure within material removal limits
- Carry out composite laminate and honeycomb sandwich repairs by scarf preparation, ply lay-up, vacuum bagging and controlled cure
- Classify a repair, link it to approved repair data and damage tolerance inspection needs, and compile the repair record for release

Target Audience:

- Structures engineering staff responsible for damage evaluation, repair design and repair data requests
 - Sheet metal repair staff responsible for fastener removal, doubler fabrication and riveted repair installation
 - Composite repair staff responsible for laminate and honeycomb panel repairs on flight control and fairing structure
 - Structures inspection staff responsible for damage mapping, repair acceptance and post-repair verification
 - Hangar and repair shop supervision staff responsible for allocating structural repair work and its documentation
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Course Outline:

Day 1: Airframe Construction, Load Paths and Damage Types

- Semi-Monocoque Stressed Skin Construction and Load Sharing
- Principal Structural Elements in Fuselage, Wing and Empennage
- Aluminium Alloy, Titanium and Carbon Fibre Airframe Material Mix
- Dent, Crease, Gouge, Crack and Puncture Damage Taxonomy
- Damage Mapping With Station, Waterline and Buttock Line Coordinates

Day 2: Structural Repair Manual, Allowable Limits and Damage Tolerance

- Structural Repair Manual Chapter Layout and Figure Navigation
- Allowable Damage Limit Tables for Skins, Stringers and Frames
- Damage Tolerance Principles and Crack Growth With Usage
- Widespread Fatigue Damage From Linked Multiple Site Cracks
- Repair Category Assignment and Supplementary Inspection Needs

Day 3: Sheet Metal Riveted Repairs and Corrosion Treatment

- Solid Rivet Alloy Codes, Head Styles and Icebox Rivet Handling
- Structural Blind Rivets With Locked Mandrels for One-Sided Access
- Doubler Sizing, Edge Distance, Rivet Pitch and Row Spacing
- Crack Stop Drilling, Flush Patches and Countersink Depth Checks
- Corrosion Pit Blend-Out, Conversion Coating and Primer Restoration

Day 4: Composite and Bonded Repairs, Airframe Inspection and Repair Approval

- Carbon Laminate Scarf Preparation, Ply Lay-Up and Overlap Rules
- Honeycomb Core Replacement, Potting and Sandwich Skin Restoration
- Vacuum Bagging, Hot Bonder Cure Cycles and Thermocouple Placement
- Fastener Hole Eddy Current and Bonded Panel Tap Testing
- Repair Approval Route, Non-Standard Repair Data Requests and Records

Day 5: Inspection Walkthrough and the Airframe Damage Assessment and Repair Plan

- Case Damage Event Walkthrough on a Lower Fuselage Panel
 - Damage Measurement Sheet Against Allowable Damage Limit Tables
 - Metallic and Composite Repair Scheme Selection With Fastener Schedule
 - Post-Repair Inspection Plan and Damage Tolerance Follow-Up Tasks
 - Airframe Damage Assessment and Repair Plan Completion and Defence
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Skills You Will Gain:

- Airframe Load Path Analysis
- Damage Measurement and Mapping
- Allowable Limit Interpretation
- Riveted Doubler Design
- Corrosion Blend-Out Control
- Composite Scarf Repair
- Bonded Panel Inspection
- Structural Repair Documentation

Why Attend This Course:

- Deliver an Airframe Damage Assessment and Repair Plan for a case damage event to the structures engineering lead and the hangar maintenance manager
- Decide whether damage is within allowable limits, needs a standard repair or requires approved repair data before work starts
- Avoid repeated repairs, extended aircraft ground time and rejected repair records caused by loose damage measurement or wrong fasteners
- Share damage mapping sheets, doubler sizing worksheets and cure cycle records with sheet metal, composite and inspection colleagues

Conclusion:

Back at work, the participant gives the Airframe Damage Assessment and Repair Plan to the structures engineering lead and the hangar maintenance manager, who use it to confirm the repair category, release materials and fasteners, book shop and cure time and decide whether repair data must be requested from the type design holder. Inspectors use its post-repair inspection plan to accept the work and set follow-up tasks. After the first repair completed under the plan, the unit should compare the measured damage, ground time and rework with the plan and update its worksheets.

Frequently Asked Questions FAQ:

What should participants know before an aircraft structural repair course on sheet metal and composites?

Participants should already inspect, repair or engineer airframe structure and be able to read structural drawings and basic material specifications. Bringing an anonymised damage report or repair drawing from their own work makes the inspection walkthrough and case planning more useful.

How does an aircraft structural repair course differ from an aircraft maintenance management course?

It teaches how to measure airframe damage and carry out metallic and composite repairs to approved data. Maintenance management courses deal with maintenance programmes, check planning, airworthiness directive tracking and contracts rather than repair workmanship and damage limits.

Why does aircraft structural repair depend on damage tolerance thinking?

Every repair changes how loads and cracks move through the structure. Damage tolerance assumes small flaws exist and grow with usage, so a repair must restore strength and also allow future cracks to be found by inspection before they reach a critical size.

What do participants take back from the aircraft structural repair course?

Participants take back an Airframe Damage Assessment and Repair Plan for a case damage event, with a damage measurement sheet, repair scheme and fastener schedule, cure cycle record and post-repair inspection plan they can adapt to their own aircraft structure.
