Course R-2
Advanced Composite Structures: Damage Repair: Phase 2

Course Summary

The R-2 repair course is designed as a direct follow-on to our M-1/R-1 course for repair designers, technicians, mechanics, supervisors, and quality assurance personnel directly involved in providing high performance repairs to advanced composite structures.

Introduction

This class is devoted to hands-on repair skills. Less time is spent in the classroom and more time is spent in the workshop, allowing the student time to practice different repair scenarios. Students will be introduced to typical repair instructions and given a variety of damaged parts and structures to perform repairs throughout the week. Practice in evaluating the material type and ply orientation of an unknown structure, and removing internal contamination (such as water ingress) are fundamental parts of this course. In addition, each student-team will be assessing damage to real composite structures (visual and tap-testing), determining a repair approach, and undertaking the repairs. Over the five-day period, three different parts will be repaired by each team of participants, with different materials and challenges with each new repair scenario. Our facility has many different types of “hot-bonders” to work with. The advantages of each will become familiar to the students as they have the opportunity to work with several of them individually throughout the week. Much emphasis is made on proper thermocouple and heat blanket placement and many different bag schedules will be explored to facilitate the repairs.

Topics

Key Lecture Topics

- Paint removal and other repair-related concerns.
- Introduction to repair instructions.
- Repair design considerations and determination of proper approach.
- Determining unknown laminates; materials and orientation.
- Dealing with contaminated structures and drying procedures.
- Bagging techniques for actual parts with limited vacuum integrity.
- Proper thermocouple placement and heat blanket selection criteria.
- Programming and use of portable process controllers (hot bonders).
- Identifying and responding to heat blanket and thermocouple problems.

Workshop Exercises

- Unknown layup determination; scarf and identify material types and orientation.
- Use of repair instructions and determination of repair approach.
- Bagging of various shaped parts.
- Damage identification and assessment using both visual and tap test methods.
- Damage removal and taper-scarf preparation.
- Drying of moisture-contaminated sandwich panels.
- Core removal and replacement in sandwich structures.
- Repair scarfing: including on actual or mock aircraft part surfaces.
- Vacuum bagging complex shapes without crushing fragile structures.
- Thermocouple repair; welding and testing.
- Cure programming and monitoring using portable process controllers (hot bonders).

Course Benefits

Attendees will gain an intermediate level of knowledge and competency in the area of advanced composite structural repair that can be employed immediately in practice.

Prerequisites

M-1/R-1 Advanced Composite Structures: Fabrication and Damage Repair - Phase 1, or

1. An equivalent certificate of completion in a comparable course from a formal composite training organization, or
2. Equivalent (5 year min) experience with *advanced composite* materials and processes, plus passing a written bypass quiz with an 80% or better grade.

(*Please contact Abaris for equivalency quiz criteria and evaluation.)

Teaching Method

Active classroom lecture and workshop exercises: 20% Theory and 80% Practical

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