Course R-1/R-2

Advanced Composite Structures: Damage Repair 1-2-Combined

Course Summary

This course combines a short introduction to composite materials and processes along with focused hands-on repair excersises using hot bonders and heat blankets. It is designed for repair stations and MRO's seeking concentrated hot bond repair training for their group, either onsite at their facility, or by arrangement at Abaris' Sparks, Nevada facility.

Introduction

This class includes an introduction to composite materials and processes and is devoted to developing hands-on repair skills. Students will be introduced to typical repair instructions and given damaged parts or structures to perform repairs throughout the week. Much emphasis is made on proper thermocouple and heat blanket placement with different bag schedules (i.e. peel ply, release films, bleeders and breathers) to facilitate quality repairs using hot-bond repair equipment.

Topics

Key Lecture Topics:

- Introduction to advanced composite materials/structures.
- Resin/adhesive systems: thermosets vs. thermoplastics, mix ratios, viscosity, service temperature limits, cold storage requirements/shelf life limits, pot life, etc.
- Material Forms: dry cloth and wet resins vs. prepregs, weave/styles, etc.
- Fundamentals of Fabrication: prepreg cloth handling, ply orientation, etc.
- Cure cycles and rheology of thermoset resin systems during cure.
- Repair design considerations and determination of proper approach.
- 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:

- Panel layup using prepreg carbon uni-tape materials; symmetric and asymmetric laminates.
- Vacuum bagging using non-autoclave bleeder/breather schedules.
- Use of repair instructions and determination of repair approach.
- Damage identification and assessment.
- Damage removal and taper-scarf preparation.
- Core removal and replacement in sandwich structures.
- Repair scarfing: including on actual or mock aircraft part surfaces.
- Cure programming and monitoring using portable process controllers (hot bonders).

Course Benefits

Attendees will gain extensive practice in repair techniques and hot bond repair methods using portable process control equipment and heating systems.

Prerequisites

None required but students should have some familiarity with composite structures, materials, and processes.

Teaching Method

Active classroom lecture and workshop exercises: 25% Theory and 75% Practical

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