Course R-3
Advanced Composite Structures: Damage Repair: Phase 3

Course Summary

This course is designed for repair designers, technicians, mechanics, leads or supervisors who want to further their education in repairs of advanced composite structures. This class presents more challenging damage assessment and repair challenges than those presented in our Phase 2 course.

Introduction

Because of the complexity of the repairs and the advanced skills that are required, this course is only being offered to students that have either graduated from our *R-2 Composite Structures: Damage Repair-Phase 2* repair course or have comparable training or industry experience.

The course is mostly hands-on, in the workshop, addressing larger and more complex repair scenarios that require multi-step repair processes. Instruction will include discussions on various methods for recreating damaged-part surfaces, as well as actual fabrication of composite repair tools used to restore a complex-contoured shape, thus restoring the critical aerodynamic surface of the part, as well as restore the lighting strike protection (LSP) capabilities of the part. Other alternative approaches to tooling will be discussed and/or employed during the class to broaden the technician's overall possibilities.

The student-teams will be subjected to realistic composite components that have sustained damage to large areas or complex features that will entail extensive evaluation and repair. The students will be tasked with creating an appropriate repair plan using standard repair procedures and creative processing schemes.

In addition, students will learn more about processing their repairs utilizing "hot-bonders" with heat blankets, heat lamps, infrared heaters, and hot-air machines. Students will have to correctly hook-up, program, and troubleshoot different "hot bonders". The students will learn the capabilities and the limitations of the different process equipment available to them within the industry. Ongoing experimentation with thermocouple placement and different heat-source equipment will be encouraged so that a working knowledge of these systems can be attained.

Repairs to composite edge-bands with fasteners/hole locations will also be addressed in this class. Methods for removal and replacement of fasteners and/or potted details in composite structures will be discussed including using the appropriate tools and techniques.

Topics

Key Lecture Topics:

- Advanced damage determination, assessment, and repair techniques.
- Developing and implementing a repair plan.
- Different types of repair tooling options.
- Recreating surface geometry using custom-fabricated repair tooling.
- Tool surface preparation; application of semi-permanent seal and release systems.
- Repair material and processing options, including the use of alternative heat sources.
- Fastener removal tools and replacement methods.

Workshop Exercises:

- Fabrication of composite repair tooling from original part surface.
- Damage assessment and removal of damage per repair plan.
- Multistage repair of large-area damage on a contoured composite part, including edge band repair.
- Curing repairs with various hot bonders and alternate heat sources.
- Post-repair evaluations and inspection of all projects.

Course Benefits

Attendees will gain insight and skills for confidently performing advanced composite structural repairs of larger size and complexity that exceeds the normal limits of the structural repair manual (SRM).

Prerequisites

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

Teaching Method

Active classroom lecture and workshop exercises: 10% Theory and 90% Practical

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