Course R-10
Helicopter Rotor Blade Repair

Course Summary

Regardless of the make and model of the helicopter, accomplishing durable, high-quality rotor blade repairs requires a certain knowledge and skill set. This course is designed for helicopter mechanics, maintenance personnel, and inspectors looking to achieve sound repairs to composite rotor blades. This five-day course will provide the knowledge and teach the skills necessary to effect quality helicopter rotor blade repairs in-house with a high degree of confidence, and a shorter turn-around time.

Introduction

The ability to accurately interpret manufacturer's repair instructions is contingent upon understanding certain basic concepts. Therefore, lecture topics will stress; the basics of adhesive technology, surface preparation of composites, bond-line control, cure cycles & process controls, treatment of contaminated areas, lightning strike protection, and follow-on maintenance. The basics of composite materials and processes are discussed in detail. Subjects like vacuum bagging, proper resin selection and mixing, and repair design are also addressed.

During the week, students will be challenged by several shop exercises. These exercises will consist of evaluating damaged sections of a rotor blades, consulting the repair instructions, and effecting the repair accordingly using process control equipment (hot-bonders). Students may also evaluate their finished repairs both destructively, and non-destructively.

Topics

Lecture Topics

- Basic Rotor Blade Design For Mechanics
- Advanced Composite Basics
- Adhesive Bonding Of Composite Materials
- Surface Prep of Metals (Emphasis on Aluminum)
- Vacuum Bagging
- Health & Safety concerns
- Repair Equipment/process controls (hot bonders)
- Repair instruction/procedures

Workshop Exercises

- Vacuum bagging practice
- Composite blade repair (Multiple schemes)
- Hot bond repairs with portable equipment

Course Benefits

Upon completion of this course, students will be able to do the following:

- Understand basic composite technologies in use today
- Identify the various material forms; carbon, glass, and aramid and their properties
- Understand basic matrix resin and adhesive rheometry (service temp. vs. Tg)
- Understand the various surface prep methods for metals with emphasis on aluminum
- Understand the physics behind vacuum bagging
- Understand the importance of maintaining bond-line control, and process control
- Understand how hot-bond repair equipment operates
- Understand basic repair philosophies of major OEM blades*
- Understand and identify various repair materials available from OEMs*
- Execute repairs based on major OEM repair procedures*
- Understand the concepts and effectiveness of various Non-Destructive Inspection (NDI) technologies

*OEM blades and procedures subject to change

Prerequisites

No formal prerequisite is required, however, (M-1/R-1) Advanced Composite Structures: Fabrication & Damage Repair-Phase 1 is highly recommended to those with little or no composite experience.

Teaching Method

Active classroom lecture and workshop exercises: 40% Theory and 60% Practical

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