Course M-2
Advanced Composite Manufacturing 2

Course Summary

This course is designed as follow-on to the M-1/R-1 *Composite Structures: Fabrication & Damage Repair-Phase 1* course and is intended for those wanting to further their knowledge of composite manufacturing, whether in preparation for employment in the advanced composite manufacturing industry, or as engineers or technicians desiring a further understanding of the practical skills involved in producing quality composite structures.

Introduction

At the end of Manufacturing 2 the student will have an intermediate level of understanding of composite layup and vacuum bagging techniques for complex shapes, fabrication of potted honeycomb core assemblies, manufacturing composite component parts using production type tooling, knowledge of machining, trimming and drilling composite components using fixtures, surface preparation methods/secondary bonding of structures, component assembly methods and techniques, as well as a acquire a fundamental knowledge of the resin vacuum infusion manufacturing process.and a fundamental understanding of the documentation and record keeping required to support composite manufacturing.

Topics

Key Lecture Topics:

- Quality assurance in manufacturing; planning, in-process inspection, and record keeping systems.
- Mold preparation; using semi-permanent polymer release systems.
- Challenges in layup of complex geometries: maintaining ply orientation/symmetry.
- Vacuum bagging complex shapes for oven and autoclave processing.
- Introduction to tooling: component specific molds and fixtures.
- Overview of non-destructive inspection methods.
- Documentation of in-process and post-process operations.
- Composite structure assembly methods and procedures.
- Mechanical fastening methods and techniques.
- Surface preparation and adhesive bonding of composites Vs metals.
- Machining, trimming, and drilling composite components.
- Rejection reports, cause and corrective actions.

Workshop Exercises:

- Mold preparation: clean, seal, and release molds for service.
- Cut and machine honeycomb core materials for use in layup.
- Cut and kit prepreg fabrics and adhesives for panel build.
- Layup, vacuum bag, and process complex sandwich core panels.
- Demold and inspect parts using non-destructive methods.
- Part marking, packaging, and storage of parts used for assembly.
- Trim and drill components for assembly using Trim and Drill Fixtures (TDF).
- Surface preparation and bond-assembly of components.
- Installation of bonded nutplates and inserts.

Course Benefits

At the end of Manufacturing 2 the student will have an intermediate level of understanding of composite manufacturing practices using manual layup and vacuum bag/oven and autoclave processing, as well as knowledge of machining, trimming and drilling composite components using fixtures, surface preparation methods/secondary bonding of structures, component assembly methods and techniques, as well as a acquire a fundamental knowledge of the resin vacuum infusion manufacturing process.

Prerequisites

M-1/R-1 Advanced Composite Structures: Fabrication & Damage Repair-Phase 1 course, or *equivalent (5-years min) experience with advanced composite materials and processes.

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

Teaching Method

Active classroom lecture and workshop exercises: 30% Theory and 70% Practical

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