DARKAERO

Aerospace Composites Course Curriculum and Schedule

DAY 1 - MORNING SESSION

8AM - 12PM Classroom Theory + Hands-On DEMOS

Welcome!

- Orientation
- Introductions
- Breakfast

Introduction to Aerospace Composites

- What are aerospace composites?
- Why use composite materials?
- Mechanics of Materials
- Establishing requirements - design example

Fiber Reinforcement (Fiber)

- Fiber types
- Fiber properties
- Weave types

DEMO Session - Composite Fabrication Setups (HANDS-ON)

- Safety equipment and best practices
- Handling and cutting different dry cloth weaves
- Handling and cutting prepreg carbon fiber
- Placing cloth into a mold
- Placing infusion/VARTM consumables into a mold
- Infusion/VARTM vacuum bag set up
- Performing a wet layup setup
- Performing a wet layup vacuum bag setup
- Performing a prepreg carbon fiber setup
- Tips, tricks, and best practices

12PM - 1PM LUNCH

DAY 1 - AFTERNOON SESSION

1PM - 5PM Classroom Theory + Hands-On DEMOS

Polymer Matrix Types (Resin)

- Epoxy
- Vinyl Ester
- Polyester
- Thermoplastics

Cloth Sizing/Coupling Agents

- Overview
- Importance in composites

Core Materials

- Foam
- Honeycomb
- Infusable Cores
- Balsa

Processes (Methods of Combining Fiber and Resin)

- Wet Layup
- Wet Layup + Vacuum Bag
- Infusion/VARTM
- Out of Autoclave Prepreg
- Autoclave Prepreg
- Filament Winding

DEMO Session - Composite Fabrication Techniques (HANDS-ON)

- Safety equipment and best practices
- Calculating resin quantity and mix ratios
- Dispensing and mixing resin
- Degassing resin
- Performing wet layup process
- Performing wet layup vacuum bag process
- Performing infusion/VARTM process
- Performing prepreg process
- Troubleshooting methods
- Tips, tricks, and best practices

5PM - ADJOURN

DAY 2 - MORNING SESSION

8AM - 12PM Classroom Theory + Hands-On DEMOS

Review of Day 1
- Quick recap
- Q&A session
- Breakfast

DEMO Session - Composite Part Demolding & Inspection (HANDS ON)
- Safety equipment and best practices
- Demolding composite parts from Day 1
- Demolding tips/tricks to avoid part/mold damage
- Non-destructive inspection methods
- Measures of quality

DEMO Session - Composite Part Trimming (HANDS-ON)
- Safety equipment and best practices
- Recommended tools
- Strategies and techniques for trimming

Techniques for Measuring Part Quality
- Identifying part defects
- Acceptance criteria
- Inspection tools
- Measuring fiber-to-resin ratio

Composite Assemblies - Bonding
- Bonded joint design
- Assembly adhesives
- Bonding procedures
- Best practices for bonding

Post Curing
- In-depth discussion from Dr. Alec Redmann - PhD

12PM - 1PM LUNCH

DAY 2 - AFTERNOON SESSION

1PM - 4:30PM Classroom Theory + Hands-On DEMOS

DEMO Session - Bonding Composite Assemblies (HANDS-ON)

- Surface preparation
- Application of assembly adhesives
- Fixturing methods

DEMO Session - Overview of Fastening Methods on the DarkAero 1

- Fastener and hardpoint examples
- Q&A of examples on the DarkAero 1

Designing Composite Structures

- Establishing requirements
- Composites vs metals vs plastics
- Selection of fiber, matrix, core, and process
- Fiber orientation and layup schedules
- Composite layup rules
- Layup schedule examples for a range of parts

Part Testing

- Non-destructive test methods
- Destructive testing
- Using test results to drive the design

4:30 PM - ADJOURN