“Composite Safety Meeting & Workshop in New Zealand”

- Workforce Education Initiatives - Level II Safety Awareness Courses

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“Composite Safety Meeting & Workshop” - WE & Safety Awareness Courses -

- **Background - Workforce Education**
  - ^ Composite Training Strategies (White Paper)
  - ^ Observations for Consideration
  - ^ FAA Workforce Education Plan
- **Level II Safety Awareness Courses**
  - ^ Composite Maintenance (CMT)
  - ^ Composite Structural Engineering (CSET)
  - ^ Composite Manufacturing (CMfgT)
- **Courses Offering via NIAR/WSU (2015)**
- **Discussion**

Background - Composites Education Justification

- FAA Biz Plan (2009) on “Composite Education Strategy” was initiated to provide roadmap for Workforce Education

Industry	Skill development via on-the-job training
FAA	Difficulties in recruiting staff with required skills
Education gaps	Talent pool versus identified institutions to address subject matter regarded as important in composites
Education delivery options	Classroom, laboratory, distance (on-line)
Educators	Availability of training expertise

Education Progresses through Three Levels

Some FAA experts

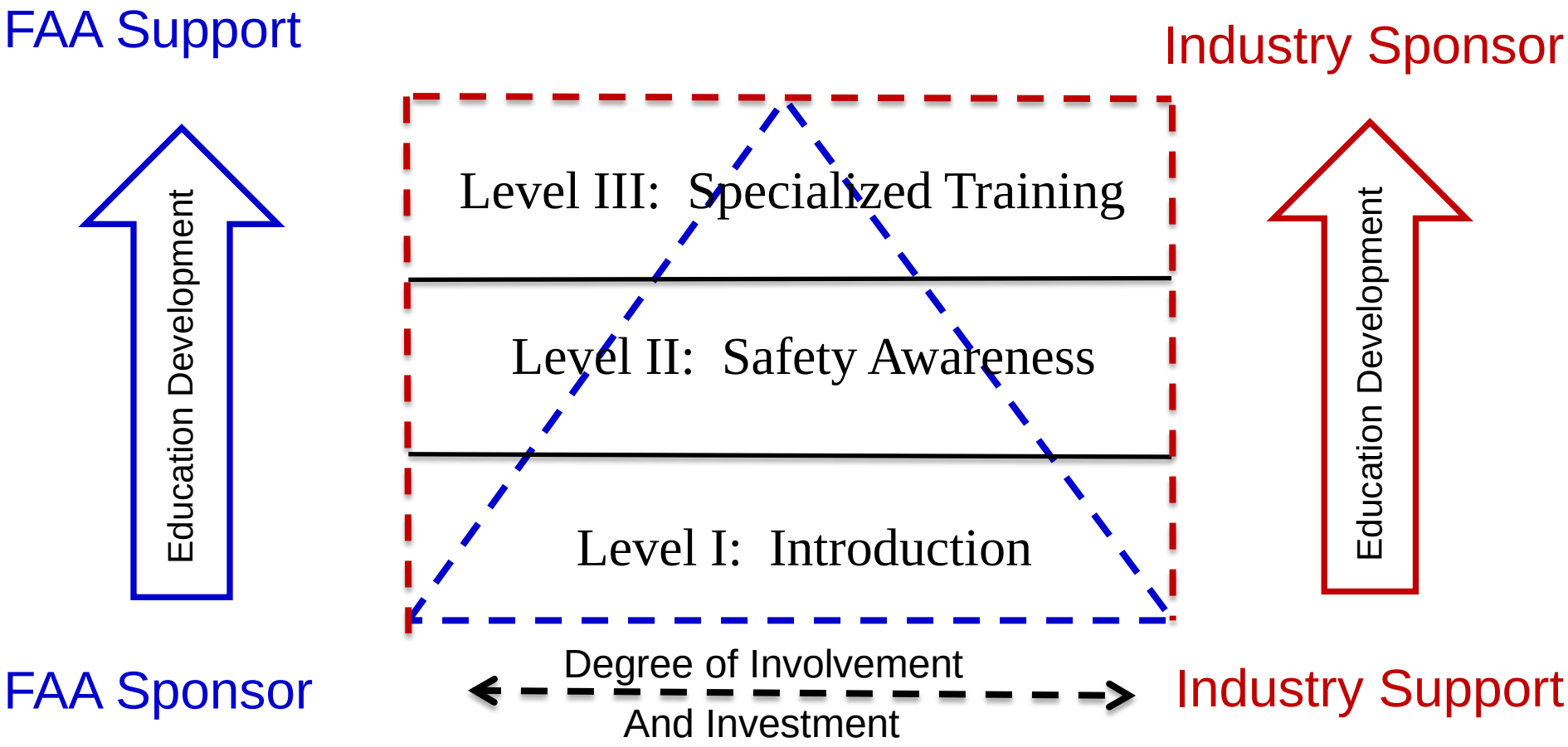
Increasing Specialization

Specialized Training (Level III)	→	1. Skill building in specific areas 2. Institutions responsible for training which have subject matter expertise 3. "Go-to" skills needed for successful applications
Safety Awareness (Level II)	→	1. Composite safety focus, including hands-on laboratory 2. More details of regulatory guidance and industry practice 3. Highest level where most standards are currently possible
Introduction to Composites (Level I)	→	1. Basics of composite technology 2. Intro to job roles & responsibilities (understand "what you don't know") 3. Certification basics

Most of FAA Workforce

Overview - FAA Composite Education Plan

FAA and Industry Participation in Development



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Level II Safety Awareness Courses

- **Maintenance Safety Awareness (CMT)**

  [International Standard: CACRC AIR5719]

  - FAA-led course development completed [9/2008]
  - FAA Audience: Flight Safety Inspectors [Content: 60 Hours]
  - AFS-500 class-room version available to FAA [Since 2009]
    - *~ 500+ AFS Inspectors trained to date through FAA contract with ABARIS*
  - On-line version available to the industry

- **Structural Engineering Safety Awareness (CSET)**

  [Sponsored by FAA R&D, AIR-520]

  - First course offering through Wichita State Univ. (WSU) [4/2013]
  - FAA Audience: Airframe Engineers & Delegations [Content: 80 Hours]
  - Available to the industry through WSU.

- **Manufacturing Safety Awareness (CMfgT)**

  [Sponsored by FAA R&D, AIR-520]

  - Completion of course development [9/2014] and first course [3/2015]
  - FAA Audience: Manufacturing Inspectors [Content: 60 Hours]
  - First course offer through Wichita State Univ. (WSU) in FY15.

Technical Document - “Critical Technical Issues for Composite Maintenance & Repair”

- **A document was developed to provide technical information on composite maintenance & repair [by SAD (Cheng & Ilcewicz), Sep/2006].**
- **Technical content includes -**
  - **Integrated product development emphasis**
  - **Operational safety links with design & production**
  - **Regulatory maintenance/repair requirements**
  - **Technical Issues include: teamwork, disposition, damage detection & characterization, repair processes)**
  - **Safety essentials**
- **Constituted as technical basis for the “Composite Maintenance Technology (CMT) course.**

SAE CACRC AIR 5719 - Checklist for Composite Maintenance Awareness Course

- **Building on SAD Tech Document: SAE CACRC developed an Aerospace Information Report (AIR) 5719 as a checklist of creating safety awareness training covering the critical technical issues associated with the maintenance and repair of composite aircraft structures.**
- **This document describes terminal course objectives (TCOs) and teaching points, which in combinations serve as a course checklist for developing the awareness courses.**
- **TCOs indicate student learning expectations for each section of the course, while teaching points convey items that should be covered within each TCO.**
- **This document is a standardized checklist regarding critical issue awareness for composite structure maintenance/repair.**

Composite Maintenance Training Reports

FAA Technical Document

Unofficial FAA document for informational purposes only

Written by FAA (L. Cheng & L. Ilcewicz)

Not a formal reference that is archived

FAA JAMS Technical Report

FAA document of JAMS R&D used for educational purposes to support course development

Written by Edmonds CC. (C. Seaton)

Formal reference that is archived

Import Key Content

SAE CACRC AIR 5719

International standard to describe essential course content

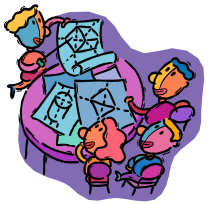
Drafted & approved by CACRC

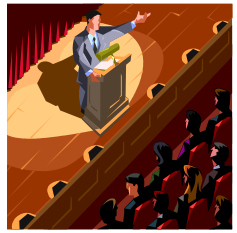
Formal reference that is archived

Industry Interface, CMH-17 Mtgs. and FAA Workshops

Basis for all reports & documents

Expert inputs and review of draft reports & course content



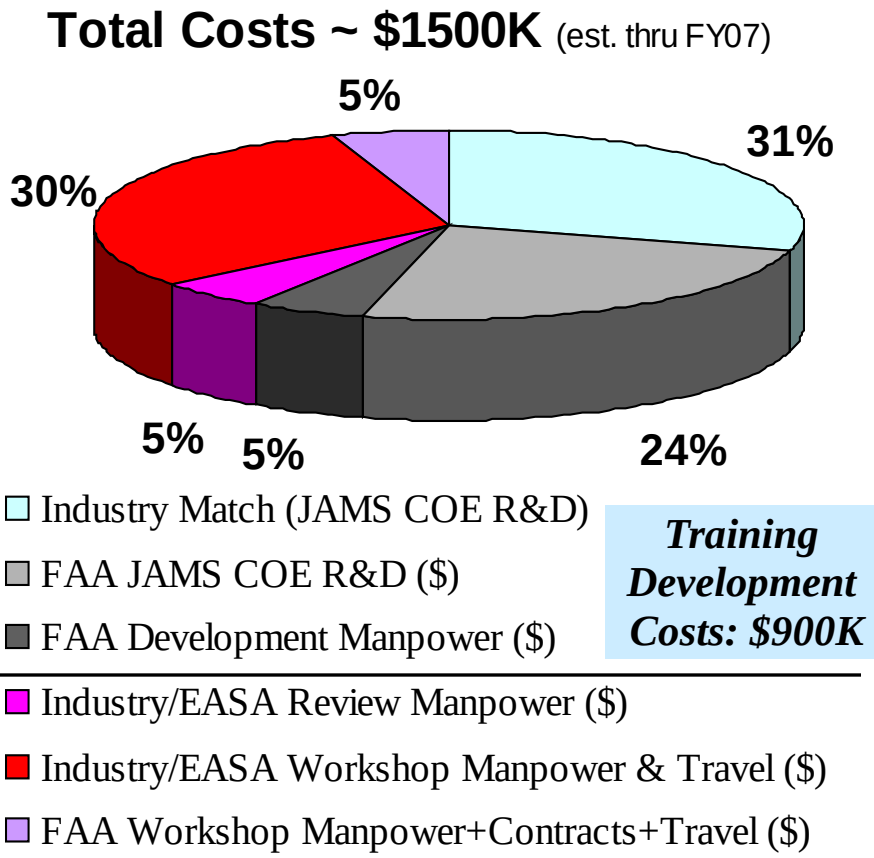


Testimonials, graphics, videos & other teaching aids

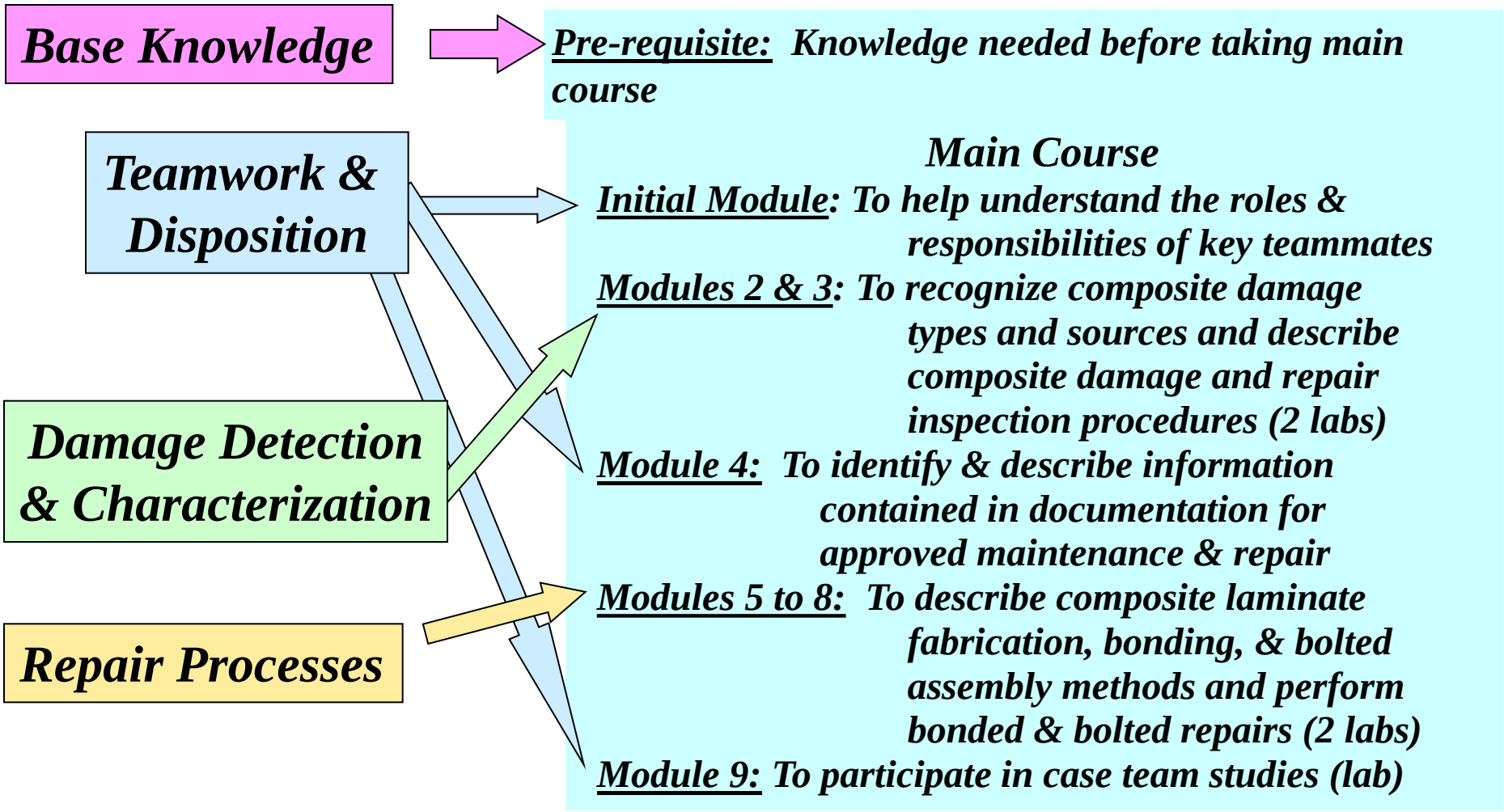
Edmonds CC. Beta courses

Joint Efforts by Industry & Regulatory Experts to Standardize a Course on *Critical Composite Maintenance & Repair Issues*

- **2004: Initial workshops to define framework (incl. course objectives on the key areas of awareness for engineers, technicians & inspectors)**
- **2005: 11 course modules drafted for workshop review**
- **2006: Update modules an develop course standard with SAE CACRC**
- **2007: Coordinated FAA/industry release of course standards**
- **2008: Make course available to FAA/industry designees**



CMT Awareness Course Structure



Composites Education

CMT Course Content

CMT Course (60 hours on-line)

- **Involvement of subject matter experts in discussion forums**
- **Multimedia**
  - Expert testimonials
  - Movie clips, including custom pulse echo (A & C scan)
- **Sample Clip**
  - Testimonial
  - Overview (Boeing/CACRC, Delta Rocket Explosion)
  - Pulse Echo inspection demonstration

Composites Education

CMT Online Discussion (with SMEs)

Week Four: Composite Repair	136	136

You read on an internet blog, the following statement;

Damage to composites are easier to repair (whoever has a boat knows that) and there is enough knowledge on composite fuselages in the last 20+ years to confirm this.

http://iaqblog.blogspot.com/2006/03/on-airbus-350-marketing-document-vs.html, dated March 11, 2006.

As a practitioner of composite maintenance and repair on commercial aircraft, you 'see red', and want to make a very brief, but insightful, comment that will enlighten the blogger's opinion without causing public hysteria about composite materials. What and how do you say this in less than 50 words?

Week Three: Underlying Damage	221	221

As someone very familiar with metal skin repair on airplanes as an inspector, you are confident that you will transition fairly easily into the practice of composite materials maintenance. However, your son ran across a disturbing article at the following link: https://www.flightsafety.org/asw/mar07/asw_mar07_p17-21.pdf

Within that article was the following graphic:

Composite Underlying Damage

Within that article, was the attached picture depicting types of damage. How does this awareness course adequately prepare you, or not prepare you, in your profession, and how should you respond as a result?

Level II Safety Awareness Courses

- **Maintenance Safety Awareness (CMT)**
  [International Standard: CACRC AIR5719]
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Composite Structural Engineering Technology Level II Safety Awareness Course Development

- **Composite Structural Engineering Technology (CSET) course development started in 2010 for *"safety awareness"***
  - 80-Hour classroom/lab equivalent (including 2.5 days of hands-on lab)
  - More hours in self-study when taught online
- **Initial top-level outline following AC 20-107B**
  (some changes made to remove redundancy)
  - Introduction, incl. difficulties faced in composite applications (2.5 hours)
  - Design, material and fabrication development (~4 days)
  - Proof of structure – static, fatigue & damage tolerance (~2 days)
  - Proof of structure – flutter (0.5 hours)
  - Manufacturing interface issues (2 hours)
  - Maintenance interface issues (3 hours)
  - Other: crashworthiness, fire safety & lightning strike protection (3/4 day)
- **2010 FAA Workshop conducted at Wichita State Univ. to "beta test" module on composite material & process control (part of design, material & fabrication development)**
  - Material & process qualification (test matrices, statistics)
  - Material & process specifications (material rqmts., process details, quality control)
  - Shared databases (NCAMP/CMH-17/SAE P-17 initiatives, equivalency sampling)
  - "Material allowables" versus design values
  - Statistical methods

Contributors - Level II CSET Course

- **FAA Composite Team (led by Larry Ilcewicz, Lester Cheng & Charlie Seaton)**
  - Structures Specialists: Dave Walen (Lightning Protection CSTA), Mark Freisthler (Transport Directorate Standards), Cindy Ashforth (STSt), Rusty Jones (STS) Angie Kostopoulos (Chicago ACO), Allen Rauschendorfer, Melanie Violette & Nathan Weigand (Seattle ACO)
  - Cabin Safety Experts: Joseph Pellettiere (Crash Dynamics CSTA), Dick Hill, Robert Ochs & Alan Abramowitz (FAA Technical Center), Jeff Gardlin (Transport Directorate Standards),
- **Key subject matter experts (SME)**
  - Peter Smith (retired Boeing)
  - Keith Kedward & Steve Keifer, UCSB (incl. composite design/analysis textbook)
  - Steve Ward (M&P control, design/analysis and proof of structure)
  - Tom Walker and D.M. Hoyt, NSE Composites (fatigue & damage tolerance)
  - Wichita State University (Yeow Ng, Waruna Senevertine, Beth Clarkson, lab development)
  - Delft University (Christos Kassapoglou)
  - Other SME (contractors and volunteers)
    - Michael Niu (UCLA, composite design)
    - Max Davis (Adhesion Associates, metal-bonding)
    - Michael Borgman (Spirit Aero, repair substantiation)
    - FAA JAMS (Paolo Feraboli, Hyonny Kim, Dan Adams)
    - John Halpin (retired Air Force)
    - Will McCarvill (retired Hexcel)
    - John Adelmann (retired Sikorsky)
    - Dan Ruffner (Boeing, Mesa)
    - Convergent Manufacturing Technologies (Univ. of British Columbia composite manufacturing experts)
    - Heatcon (Field and Production repairs, including those performed on-airplane)
    - Workshop participants: presentations, discussions, testimonials (M&P control, fatigue & damage tolerance, crashworthiness)

Structural Engineering Technology (CSET)

- **CSET Course Outline**
  - 1.0 Introduction
  - 2.0 Challenges of Composite Applications
  - 3.0 Design, Material and Fabrication Development
  - 4.0 Proof of Structure
  - 5.0 Quality Control of Composite Manufacturing Process
  - 6.0 Maintenance Interface Issues
  - 7.0 Additional Considerations
    - 7.1 Proof of Structure – Flutter +
    - 7.2 Crashworthiness
    - 7.3 Fire safety and fuel tank issues
    - 7.4 Lightning protection

Overall (Top-Level) Objectives of Composite Structural Engineering Technology Course

- **Students will describe the essential safety awareness issues associated with composite structural engineering technologies important to safe applications of composites to aircraft products**
- **Students will describe engineering principles of substantiating composite airframe structures during all stages of aircraft product certification**

Composite Structural Engineering Course Syllabus
(May to August, 2015)

Course Content Schedule

WEEK	TOPICS
ONE May 18 – May 24	Prerequisite (Passing grade of 90% on exam required, with students able to re-take the exam to improve the score if required)
TWO May 25 – May 31	1.0: Introduction 2.0: Challenges of Composite Applications 3.1: Integrated Product Teams 3.2.1: Overview of Materials Process and Control 3.2.2: Material Control
THREE June 1 – June 7	3.2.3: Process Control 3.2.4: Materials and Process Control "Real Life" Problems 3.3.1: Structural Design Details 3.3.2: Lamination Theory and Design 3.3.3: Composite Structure Failure Modes
FOUR June 8 – June 14	3.3.4: Environmental Conditions 3.3.5: Typical Design Requirements, Criteria, and Objectives 3.3.6: Analysis Methods 3.3.7: Finite Element Analysis 3.3.8: Material Allowables, Design Values, and Knockdown Factors
FIVE June 15 – June 21	3.3.9: Structural Bonding (Metals and Composites) 3.3.10: Structural Bolted Attachments and Joints 3.3.11: Other Design Considerations Flutter (Lightning, Fire Safety, Crashworthiness) 3.3.12: Protection of Structure 3.3.13: Manufacturing – Design Interface
LABORATORY June 23 - 24	Hands-on laboratory (Wichita State University & National Institute of Aviation Research (NIAR), Wichita, KS)
June 29 – July 5	COURSE BREAK

SIX July 6 – July 12	3.3.14: Maintenance-Design Interface 3.4: Manufacturing Implementation 3.5: Maintenance Considerations as Related to Structural Development and Service Implementation 3.6: Statistical Methods
SEVEN July 13 – July 19	4.1: Regulations and Guidance 4.2: Proof of Structures– Static 4.3: Proof of Structures– Fatigue and Damage Tolerance 4.4.1: Relationship between Static Strength; Fatigue and Damage Tolerance 4.4.2: Demonstrating Compliance 4.4.3: Damage Threat Assessment, Design Criteria, and Testing 4.4.4: Damage Tolerance and Maintenance 4.4.5: Repeated-Load Reliability 4.4.6: Effects of In-Service Environment
EIGHT July 20 – July 26	4.5.1: Compliance Via "Test" Versus "Analysis Supported by Test" 4.5.2: Deterministic versus Probabilistic Considerations of Damage 4.6: Program Plan Development 4.7.1: Sources of Damage and Manufacturing Defects 4.7.2: Complexities of Structural Impact Damage 4.7.3: Characterizing Damage and Defects via Inspection 4.8: Design Criteria for Damage and Defects 4.9: Design Considerations for Damage Tolerance
NINE July 27 – August 2	4.10: Damage Threat Assessment 4.11: Repeated-Load Reliability and LEFs 4.12.1: Introduction to Building Block Approach 4.12.2: Design Values Accounting for Material and Process Variability 4.12.3: Environment, Defects, Damage, and Repair 4.12.4: Structural Impact Surveys 4.12.5: Typical Tests – Static 4.12.6: Typical Tests – Fatigue and Damage Tolerance
TEN August 3 – August 9	4.12.7: Static Analysis Correlation with Tests 4.12.8: Residual Strength Analysis Correlation with Tests 4.12.9: Additional Analysis/Tests to Cover Material/Process Changes 4.13.1: Full Scale Testing – Environmental Effects 4.13.2: Full Scale Testing – Defects and Damage 4.14: In-Service Inspection Program Definition and Substantiation
ELEVEN August 10 – August 16	5.0: Quality Control of Composite Manufacturing Processes 6.0: Maintenance Interface Issues
TWELVE August 17 – August 23	7.1: Flutter and Other Aeroelastic Instabilities 7.2: Crashworthiness 7.3: Fire Safety and Fuel Tank Issues 7.4: Lightning Protection for Aircraft Composite Structures

Structural Engineering Technology (CSET)
Example Module Content

- **CSET Course Outline**
  - 1.0 Introduction
  - 2.0 Challenges of Composite Applications
  - 3.0 Design, Material and Fabrication Development
    - [3.1 - Integrated Product Team (IPT)]
    - [3.3.14 – Design-Maintenance Interface]
  - 4.0 Proof of Structure
  - 5.0 Quality Control of Composite Manufacturing Process
  - 6.0 Maintenance Interface Issues
  - 7.0 Additional Considerations
    - 7.1 Proof of Structure – Flutter +
    - 7.2 Crashworthiness
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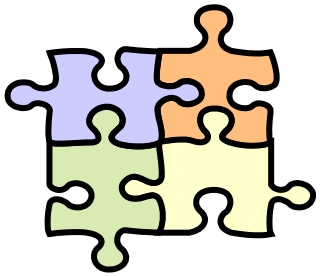
Integrated Product Team (IPT)

- **An IPT develops and supports a particular product.**
  - airplane
  - component (*fuselage, wing, landing gear, etc*.)
- **The goal is to bring together different disciplines, to optimize the product as a whole, early in and throughout the design process.**
- **IPTs are not unique to composite designs.**
- **The IPT approach has proven successful in optimizing composite designs and reducing problems typically encountered during product development and certification.**



- **Members of the IPT are expected to provide engineering approvals for their area of responsibility.**
- **Members of the IPT also address manufacturing non-conformities through the use of a Material Review Board (MRB)**

IPT Disciplines

ENGINEERING

- **Design**
- **Structural Integrity**
- **Materials & Processes**
- **Electrical**
- **Special Technologies**
- Aerodynamics
- Propulsion (*Engines*)
- External Loads
- Weights and Balance

Disciplines in **RED** require specialized knowledge of composite materials.

MANUFACTURING

- **Planning**
- **Producibility**
- **Tooling**
- **Quality Assurance**

CERTIFICATION

- **Certification Engineer**
- **FAA Designees (*DER, DAR, ODA*)**

OTHER

- **Project Management**
- **Procurement**

Maintenance Considerations

- **Why maintenance issues should be considered during the design phase of composite structures development**
  - Designing for repairability is an essential element in the effective use of composite materials in aircraft structures. Selecting a repair approach during the design phase may influence the choice of manufacturing options and design strain levels
  - It is important that the repair philosophy be set during the conceptual design stage and that the repair designs be developed along with the component design
  - Repair concepts and materials should be standardized to the maximum extent possible, and repair considerations are appropriate for concept development of any aircraft structural component
  - Ability to accomplish bonded and bolted repairs needs to be considered during initial design when choosing layup and structural configuration

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CMfgT Development Plan/Strategy

- **Selected contractor (Convergent Manufacturing Technologies) qualified to create most of the course with FAA support**
  - Involve FAA Manufacturing Inspection District Offices (MIDO @ SEA, ICT, MSP) focal from the start.
  - Work with FAA composite experts to refine content as needed for MIDO Aviation Safety Inspectors (ASI) and industry designees.
- **Followed "near-ideal" approach to course development**

  Detailed outline → TCO/teaching points → Course content → Beta review with industry → Course implementation
- **FAA/NIAR conducted Beta Course Assessment Workshop with strong participation of industry experts (May/14).**
- **Completed course development in FY 2014.**

Overall Objective of CMfgT Course

- **Students will describe the essential safety awareness issues associated with composite manufacturing technologies & processes important to conformity of type design.**
- **Students will describe deficiencies on the factory floor that have safety implications.**

Configuration - Level II CMfgT Course

Composite Manufacturing Safety Awareness Course [60 hours, incl. Labs, Excluding Prerequisite]

- **Prerequisite**

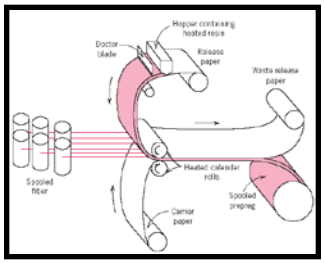
  This will contain basic knowledge of composite materials and manufacturing technology. This is intended to be an independent study with assessment examination (Total 5 - 10 hours).

- **Main Course**
- **Laboratory Sessions**

  Laboratory to illustrate course principals and consequences of process deviations. Lab sessions to be conducted in FAA designated regional laboratories.

CMfgT Followed a Logical Flow Understood by Safety Professionals Involved in Manufacturing Oversight

Prepreg Production

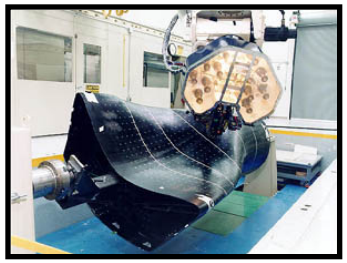


Transportation

Storage

Tooling Preparation

Layup



Debulking / Bagging

Cure

Inspection

Assembly

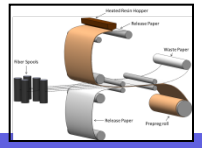
- ***Course presented from a factory perspective as would be experienced by a MIDO inspector***
- ***At each step, discuss deviations (and defects), root causes, in-process and post-process controls***
- ***Introduced information over a number of passes***

0.1. Introduction to Composites

0.2. Composite Factory Workflow

COURSE MODULES

1. Raw Materials Manufacturing

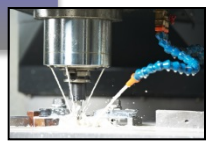


2. Transport, Incoming QC and Storage

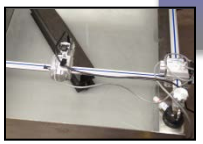
3. Tool Prep, Cutting, Layup and Bagging

4. Cure and Solidification

5. Trim and Drill



6. Inspect



7. Bonding and Part Assembly

8. Paint and Finish

9. Handling and Storage

10. Common Manufacturing Issues

Content Overview - Module 0.1 "Introduction to Composites"

- **"Composites 101"**
  - To ensure that the students' level of background knowledge in composite materials, composites manufacturing processes and composites structures is sufficient to successfully complete the course.
  - The emphasis is to bring all students up to a standard baseline level of knowledge.
- **This module has three sub-sections:**
  - Section 0.1.1 Composite material fundamentals
  - Section 0.1.2 Regulatory requirements
  - Section 0.1.3 The role of the ASI

Content Overview - Module 0.2 "Composites Factory Workflow"

- **Class content is arranged to match the typical factory flow**
- **Objectives:**
  - Introduce the variety of composites manufacturing facilities based on different material forms and manufacturing processes.
  - Introduce the fundamental processing steps that are common within various manufacturing processes.
- **Emphasis is on the fundamental processing steps that are common within various manufacturing processes.**

Content Overview - Module 1
"Raw Materials Manufacturing"

- **Objectives**
  - Introduce the manufacturing processes of the individual constituents of composites as well as the composite forms.
  - The student should appreciate the relationship between the constituents manufacturing and the composite form on the resulting composite structure.
- **Emphasis is on how the initial materials and their forms affect the subsequent composite properties and performance.**

Content Overview - Module 2
"Transport, Incoming QC and Storage"

- **Objectives**
  - Understand the importance of managing environmental conditions (temperature, humidity, etc.) for the composite constituents from the time of raw material manufacture to production.
  - Understand the impacts of environmental conditions on the quality of the materials and final product/
- **Emphasis is on how to control environmental conditions through specifications, testing, etc., to ensure the quality of the finished product**

Content Overview - Module 3
"Tool Prep, Cutting, Layup and Bagging"

- **Objectives**
  - Introduce the importance of tool preparation, cutting, layup and bagging on the quality of manufactured parts.
  - Introduce methods to assure quality during the layup process, including environmental controls
- **Emphasis is on the relationship between tool preparation, cutting, layup and bagging on the quality of manufactured parts.**

Content Overview - Module 4 "Cure and Solidification"

- **Objectives**
  - Introduce the various factors that affect how the material cures and consolidates (Temperature, Pressure, Time, Vacuum, etc.)
  - Explain the difference between thermosets and thermoplastics.
  - Demonstrate the importance of cure on the resulting structural properties
- **Emphasis is on the nature of cure, how it is dependent on time and temperature, and the effect on final structural properties**

Content Overview - Module 5
"Trim and Drill"

- **Objectives**
  - Understand the differences in machining composites versus metals, woods and plastics
  - Understand the effect of dull tools and improper machining procedures on local delamination, thermal degradation, etc.
- **Emphasis is one the differences between machining composites versus metals, and the importance of proper techniques to avoid mechanical and heat damage in the composite.**

Content Overview - Module 6 "Inspect"

- **Objectives**
  - Introduce common NDI techniques for cured parts.
  - Understand the advantages and disadvantages with different NDI techniques, and select appropriate techniques for a given application.
- **Emphasis is on the most common NDI techniques and how to assess the appropriateness of the technique and NDI setup for a given application.**

Content Overview - Module 7 "Bonding and Part Assembly"

- **Objectives**
  - Introduce common bonding and assembly techniques.
  - Describe the advantages and disadvantages between adhesive bonding and mechanical assemblies.
  - Discuss the challenges in inspecting and qualifying joints.
- **Emphasis is to describe the importance of critical steps in bonding and assembly of composite components.**

Content Overview - Module 8
"Paint and Finish"

- **Objectives**
  - Introduce common painting and finishing techniques.
  - Describe typical control documents for finishing product application, storage and testing
- **Emphasis is on ensuring that any finishing technique is properly tested and qualified against appropriate control documents**

Content Overview - Module 9 "Handling and Storage"

- **Objectives**
  - Describe sources of potential damage during handling and storage and common preventive methods.
  - Understand appropriate environmental conditions for storage (e.g. moisture content, temperature fluctuations, UV protection).
  - Understand risk of undetected damage
- **Emphasis is on the importance of safe handling and storage procedures.**

Content Overview - Module 10
"Common Manufacturing Issues"

- **This is a catch-all section for subjects that are common throughout the manufacturing process**
  - MRB, Scaling Issues, Dimensional Deviations, etc.
- **Present practical examples of common manufacturing issues, means of early detection and corrective measures.**
- **Emphasis is on understanding the root cause of defects and the appropriate corrective actions.**

FAA Collaboration With NIAR/WSU

- **FAA development budgets have many research projects through NIAR/WSU (incl. course developments, leading to WSU continuous education business opportunities)**
- **NIAR/WSU has derived strategies and working relationships for FAA continuous education coursework**
  - Marketing should lead to sufficient numbers of students and class longevity once reputation is established and students realize benefits
  - Past CSET, CMfgT & CMT sessions have led to an understanding for future offerings (student needs, interests and background)
- **FAA Instructor involvement benefits both the FAA (reduced student costs) and NIAR/WSU (regulatory presence)**
- **Current contracted instructors have long-standing NIAR/WSU & FAA relationships (research & training development initiatives)**

Offering via Wichita State University (2015)

http://webs.wichita.edu/?u=CONTED&p=/PublicEngineeringCourses/

Composite Manufacturing Technology (CMfgT) Course

- **Course Description: This course will provide students with a technical knowledge of composite manufacturing to a level that allows them to better and more proactively identify deficiencies on the factory floor that have safety implications. This course was developed by Wichita State University in collaboration with key industry experts and the Federal Aviation Administration. Students will study advanced topics during an on-line, interactive learning experience via Blackboard. Teaching methodology includes online discussions facilitated by subject matter experts, relevant documentation, and audio/visual aids. Depending on prior knowledge and experience, students will spend approximately eight hours per week reviewing materials, participating in online discussions, and testing their knowledge. Depending on the students skill set and back ground the time investment may fluctuate a bit. The course will conclude with a 2-day hands-on laboratory.**
- **Intended Audience:**

  - MIO/MIDO inspectors participating in the certification of composite structures.
  - FAA designees, international civil aviation authorities and engineers responsible for quality system development, approval and oversight of manufacturing processes for composite structures.
- **Course Delivery Method: Online with a hands on lab**
- **Course Length: Approximately 9 weeks**
- **Course Start Dates: March 2, 2015 (next offering starting in May, 2016)**

Offering via Wichita State University (2015)

Composite Structural Engineering Technology (CSET) Course

- **Course Description: This course will provide students with an awareness of safety issues related to engineering, manufacturing, maintenance, and certification of composite materials associated with civil aircraft structures, in accordance with AC 20-107B (Composite Aircraft Structure). This course was developed in collaboration with Wichita State University, key industry experts, and the Federal Aviation Administration. After finishing a 1-week period of self-study of fundamental composites and successfully completing an examination, students study more advanced topics during an on-line, interactive learning experience via Blackboard. Teaching methodology includes online discussions facilitated by subject matter experts, relevant documentation, and audio/visual aids. Depending on prior knowledge and experience, students will spend up to ten hours per week reviewing materials, participating in online discussions, and testing their knowledge. The course will include a 2.5-day hands-on laboratory, which is optional but highly recommended.**
- **Intended Audience:**
  - FAA Directorate/ACO engineers & industry designees participating in the certification of composite structures.
  - Engineers at aerospace companies who are involved in designing and analyzing composite structures
  - International Civil Aviation Authorities and their designees responsible for certification of composite structures
- **Course Delivery Method: Online with an optional hands on lab**
- **Course Length: Approximately 12 weeks**
- **Course Start Dates: May 18, 2015 (next offering starting in Sept., 2016)**

“Composite Safety Meeting & Workshop”
- Workforce Education & Level II Courses -

- **Thanks for the Opportunity**
- **Questions and/or Thoughts?**
- **Further Discussion**