



Course Development:  
Maintenance of Composite Aircraft  
Structures

*Process, Progress and Results*

*Charles Seaton – Principal Investigator, Edmonds Community College*



## General Comments Course Caveats

*This course...*

- ✦ *Provides an overview of the issues involved in composites' maintenance and repair, beginning with a common level of knowledge of composite materials terminologies and concepts*
- ✦ *Is not intended to provide training that qualifies students as composite repair practitioners*

# Primary Deliverables

- Terminal Course Objectives (TCO)  
+ Course Description Abstract  
(Purpose/intent, Student/participant,  
justification, *development team\**)
- Modules  
Safety Messages

Coordinated Release  
Through SAE CACRC and  
FAA Technical Center  
*\* World Class Team*

- TCOs, Content, Assessments
- Progress – Focus on process

Edmonds C.C.  
Website

- FAA guidelines (precursor to policy) on training needs:  
*Critical Composite Maintenance & Repair Issues*

# Curriculum Development: Composite Materials Maintenance and Repair

*Edmonds Community College*





# Curriculum Development

## Critical Elements

- Framework defined by Terminal Course Objectives (TCOs)
- Content to populate TCOs
- Assessment
  
- Deliverables: Publish TCOs, Content and curriculum enhancements by EOY 2005 – Phase I
- Deliverables (2006): Develop course and assessments – Phase II

# Curriculum Development

## *Collaboration of Industry & Academia & Government*

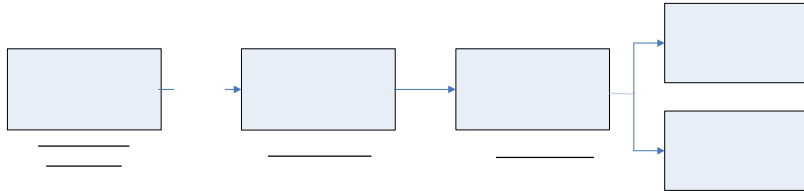
### • Workshops during curriculum development

- FAA/Industry/Academia Workshop in Seattle, WA (November/December 2004) *Establish course framework by identifying terminal course objectives (TCOs)*
- Tele-conference (April 2005) - ~10 participants
- FAA Workshop (Chicago - Sept 2005) *Evaluate content relative to course framework as defined by TCOs*

### • Results

- 2004 workshop – 450 skills identified; 60+ TCOs; 11 major areas (modules)
- Workshop report posted on AMTAS web-site for review: Jan 05
- Workshop attendees invited to evaluate progress and provide suggestions via tele-conference: April 28, 2005
- Increase in scope, resulting in prerequisite course plus additional content detail and tools
- Major Achievement: Consensus on course expectations
- **MODULES (11): ALLOWS US TO FOCUS ON WHAT'S IMPORTANT**

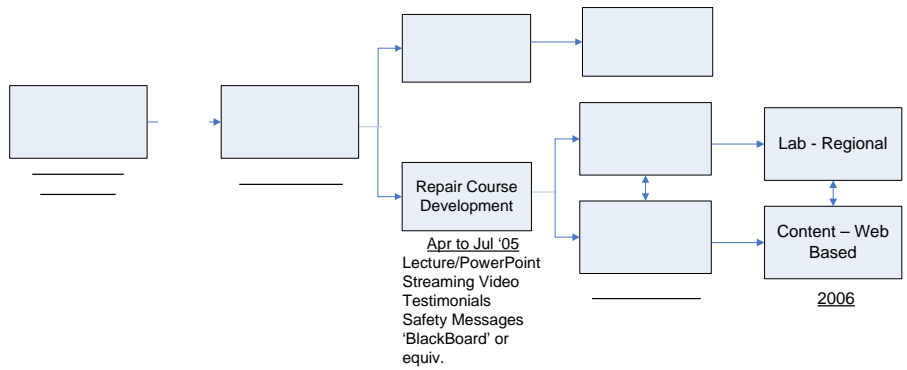
# Original Statement of Work



TCO Development

Nov/Dec '04  
Workshop

# Revised Statement of Work



TCO  
Development

Wor  
Fee

Nov/Dec '04  
Workshop



# Curriculum Development

*2005 Chicago Workshop*

- **Modules: Grouped into Key Subject areas and provided to small teams for preliminary assessment before workshop**
  - Published on website for participant viewing
  - Focus: Define issues based on content
- **Objective: 2005/2006: Publish course content and other teaching tools in 'public domain'**
  - Terminal Course Objectives (TCOs), categorized by modules
  - Written content, corresponding to TCOs
  - Testimonials and Videos
  - Laboratory instructions



# Modules

**TCO A Module** - Understand Basics of Composite Materials Technology

**TCO B Module** - Understand the Basics of Composite Materials Maintenance and Repair

**TCO J Module** - Understand other Critical Elements of Composite Maintenance and Repair

**TCO C Module** – Understand Roles and Responsibilities

**TCO D Module** – Recognize Composite Damage Types and Sources

**TCO E Module** – Identify and Describe Information Contained in Documentation

**TCO F Module** – Describe Composite Laminate Fabrication and Bonded Repair Methods

**TCO G Module** – Perform a Bonded Composite Repair

**TCO H Module** – Describe Composite Damage and Repair Inspection Procedures


















**TCO I Module** – Describe Composite Laminate Bolted Assembly and Repair Methods, and Perform and Inspect a Bolted Composite Repair

**TCO K Module** – Case Team Studies

# Elements of Curriculum

## *Relationship to Course Design*

Elements (published)	Technique	Custom Curriculum
TCOs & Content		Learning techniques
Flight Safety Messages	STORY BOARD	Modified mix of elements
Testimonials		Teaching format
Videos		Target audience characteristics

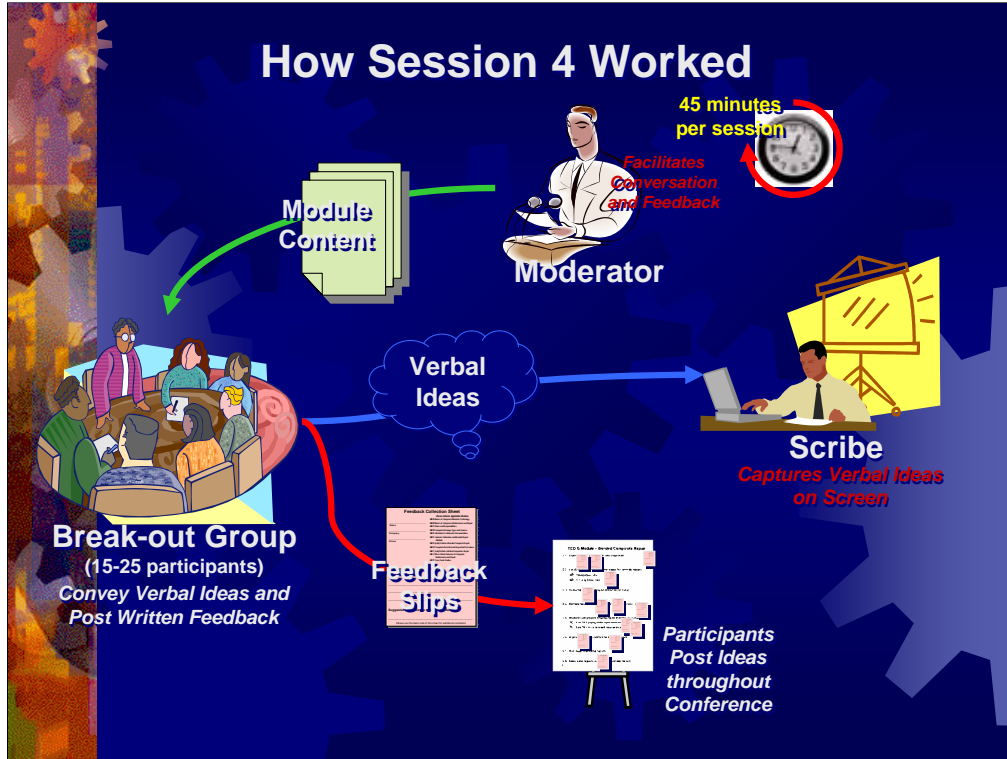
Tuesday			Intro to Composite Maintenance & Repair Timeline		
<b>Morning</b>  8:00 to 9:50	<b>Primary Mode[s]:</b>  Lecture  <b>Supplemental Mode[s]:</b>  P. Pt Presentation   Testimonial from Practitioner	<b>Topics:</b> TCO [E] Identify & describe information contained in documentations E1: Describe requirements in material & process specifications and structural repair manuals E2: Demonstrate use of source documents E3: Identify & demonstrate use of regulatory documents E4: Understand the requirements and engineering approvals necessary for valid sources of technical information & maintenance instructions  <b>Fight Safety Message #3</b>	 Total Time: 1hr 50min		
<b>Morning</b>  9:10 to 10:10	 Intermission		 Total Time: 20 min		
<b>Morning</b>  10:10 to 12:00	<b>Primary Mode[s]:</b>  Lecture  <b>Supplemental Mode[s]:</b>  P. Pt Presentation  Video   Testimonial from Practitioner	<b>Topics:</b> TCO [F] Describe composite laminate fabrication & bonded repair methods F1: Understand the basics of composite laminate fabrication F2: Understand the basics of composite bonded repair F3: Describe the detailed processing steps necessary for laminate fabrication [factory], bonded repair [field], and Material Review Board (OEM) F4: Describe key characteristics and processing parameters for laminate fabrication F5: Identify typical processing defects which occur in composite laminate fabrication & bonded repair.  <b>Fight Safety Message #4</b>	 Total Time: 1hr 50min		
<b>Afternoon</b>  12:00 to 1:00	 Lunch		 Total Time: 1 hr		



## Safety Messages

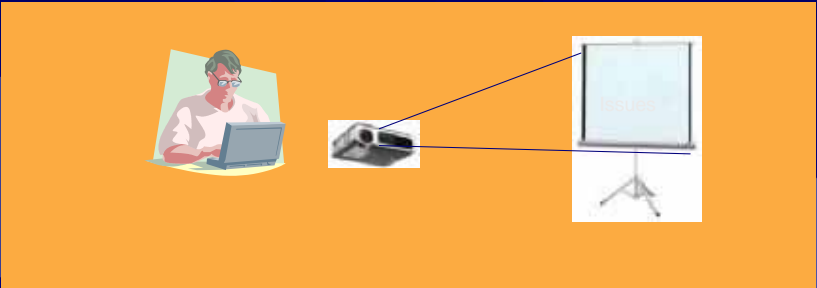
- 1: Interlinked aspects of composite repair
- 2: Repair disposition
- 3: **Repair documentation**
- 4: Correct processing
- 5: In-service inspections
- 6: Procedures and post-repair of bonded repairs
- 7: Post-repair inspections
- 8: Bolted repairs
- 9: Importance of teamwork





# Issues Feedback: Workshop

Session 5 (Thursday Morning): Scribe Reviewed Section 3 & 4 Inputs



- Themes**
- TCO/Content Consistency
  - Content Balance
  - Primary Emphasis on Issues of Safety Concern
  - Path to Complete Review and Update the Course Standard



## Workshop Results

- ✦ Building curriculum framework: TCOs
  - Refined descriptions to better reflect intent
  - Prerequisite course contrasted with repair course – clarified in small group discussions
- ✦ Providing content to support TCOs
  - 'Tightened up' content

The background of the slide is dark blue with several semi-transparent gears of various sizes and colors (blue, grey, orange) scattered across it. On the left side, there is a vertical strip showing a colorful, abstract cityscape or industrial scene with warm tones like orange, yellow, and red.

## Next Steps

- Integrate feedback into TCOs and Content
- Publish outcomes on websites
  - Presentations
  - TCO and Content Revisions



## Posting & Links of Workshop Results

Detail of Workshop: [www.mpdc.biz](http://www.mpdc.biz)

Overview: [depts.washington.edu/amtas/](http://depts.washington.edu/amtas/)

Links: [www.niar.twsu.edu/newniar/](http://www.niar.twsu.edu/newniar/)

The image shows a screenshot of a website titled "Material and Process Development Center". On the left side, there is a vertical navigation menu with five blue circular icons and corresponding text: "Home", "About the MPDC", "Programs", "Contact", and "Links & Learning". The main content area features a large, semi-transparent white box with a blue border. At the top of this box is a red rectangular button labeled "2005 FAA Chicago Workshop". A yellow arrow points from the text "Click on this Link" to this button. Below the button, the text reads: "Welcome to the MPDC", followed by a paragraph: "The Material Science field is always changing and innovating, and we would like to help bring you closer to that cutting edge by offering you resources and training on the latest developments. If you are involved in the field and would like to contribute anything, please contact us." Below this is another paragraph: "We would like to mention that we just finished a major overhaul of our website with more to be added soon. We will be cleaning up the look a bit, as well as increasing the content. Your suggestions are welcomed." Below the main content area, there is a section titled "Latest News and Events" with a horizontal line underneath. Under this section, the date "10 - 2005" is displayed, followed by a blue box containing the text "2005 FAA Chicago Workshop". Below this box, it says "Here you will find notes, movies and documentation on the 2005 FAA Workshop in Chicago". The entire screenshot is set against a dark blue background with a large gear icon on the right and a colorful gear pattern on the left.