Course Development: Maintenance of Composite Aircraft Structures

- **Motivation and Key Issues**
  - Practical, introductory-level awareness course for engineers, technicians and inspectors and any person involved with composite maintenance and repair

- **Objective**
  - Develop a balanced framework, with content and assessment criteria as a basis for curriculum training
  - Online course, with ‘hands-on’ laboratory, which will increase awareness of critical safety issues in composites’ maintenance

- **Approach**
  - Series of workshops and ‘beta’ class with experienced practitioners
  - Industry, regulatory and academic collaboration
FAA Sponsored Project Information

- Principal Investigators & Researchers
  - Charles Seaton, Principal Investigator, EdCC
  - Cyndi Schaeffer, Executive Director, EdCC
- FAA Personnel
  - Larry Ilcewicz, Curt Davies
- Industry Participation
  - Boeing, Airbus, EASA, Hexcel, Heatcon, Abaris and others
Motivation and Key Issues Overview


• Safety implications of maintenance and repair of composite materials accessible to a broad audience
  – Web-based, distance learning + regional labs
  – FAA guidelines on training needs (precursor to policy)

• Course is not intended to train qualified practitioners
Motivation and Key Issues Implementation

• Web-based course (4 credit hours)
  – Edmonds Community College
  – Industry partners for regional labs

• FAA Technical Center Report
  – Public domain
  – Course objectives, safety messages, testimonials, teaching points and instructor’s guide
  – 300 – 400 pages
  – Coordinated release with SAE CACRC (industry)

• Teaching points
  – Specific instructional topics organized by TCO

• Assessments by users on effectiveness of training
  – Course assessments & success in integration of course content into workplace
History

• Series of workshops to bring regulators and industry together on technical issues
  – 2004 Kickoff for FAA research to evaluate training needs
  – 2005 and 2006 FAA Workshops to review progress in establishing training needs

• Industry and government experts recruited to support the development of training standards
  – 2004 Seattle workshop defined terminal course objectives (TCO)
  – 2005 Chicago workshop used to review draft modules that will be released with the TCO as industry standards
  – Other feedback
    • Boeing/Airbus/EASA review – recommend updates
    • Web-based conferencing
    • Beta course conducted at EdCC

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TCOs Organized by Key Subjects

• Base knowledge
  – Understand basics of composite materials technology
  – Understand basics of composite materials maintenance and repair
  – Consider other critical elements of composite maintenance and repair
  – Be aware of developments in composite maintenance research
TCOs Organized by Key Subjects

• Teamwork and disposition
  – Understand roles and responsibilities
  – Identify and describe information contained in source documentation
  – Participate in case team studies
TCOs Organized by Key Subjects

- Damage detection and characterization
  - Recognize composite damage types and sources
  - Describe composite damage and repair inspection procedures
TCOs Organized by Key Subjects

• Repair processes
  – Describe composite laminate fabrication and bonded repair methods
  – Perform bonded composite repair
  – Describe composite laminate bolted assembly and repair methods and perform/inspect bolted repair
On-line Training

• Course objectives guide course and provide balance (TCOs, or terminal course objectives)
• Contains course materials for distance learning (‘blackboard’ baseline)
  – TCOs
  – Content and weekly assignments
  – PowerPoint slides/videos/etc.
• Discussion of case studies to provide meaning & enhance learning
On-line Training: Resources

- **Edmonds community college** ([http://online.edcc.edu/](http://online.edcc.edu/)): experienced provider of online courses (~2,000 students per quarter)
  - Associate degrees (bus mgt, liberal arts, others)
  - Bachelor degree partnerships (WSU, UW)
  - Certificate programs (office skills, project mgt, others)
- **Facilitator provided by EdCC, experienced in composites’ technology**
  - Assists in coordinating elements of course (grading, assessments, assignments)
- **Involve experts (under discussion)**
  - Facilitate topical discussion (typically 1 or more weeks per class)
A Look Forward

• **Benefit to Aviation**
  – Relates to a FAA goal for outlining *what* needs to be considered for aircraft safety.
  – Provides a *balanced* approach to training, based on industry collaboration
  – Provides a *perspective* to practitioners and students: *Knowing what you don’t know, and when to go for help.*

• **Future needs**
  – Identify additional training development needs
  – Provide directions for future research and development

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