



# Edmonds Community College

## Course Development: Maintenance of Composite Aircraft Structures

### Presenter

Charles Seaton – Edmonds Community College

# Overview of Course Development Process

## Time Frame

- ✦ September 2004 through September 2005
- ✦ Workshop – November 30, 2004 through December 2, 2004
- ✦ Curriculum Development and Delivery – Jan 2005 through Sept 2005
- ✦ 'Yellow Pages' – Web based resource for training from academic and industrial sources

# Edmonds Community College

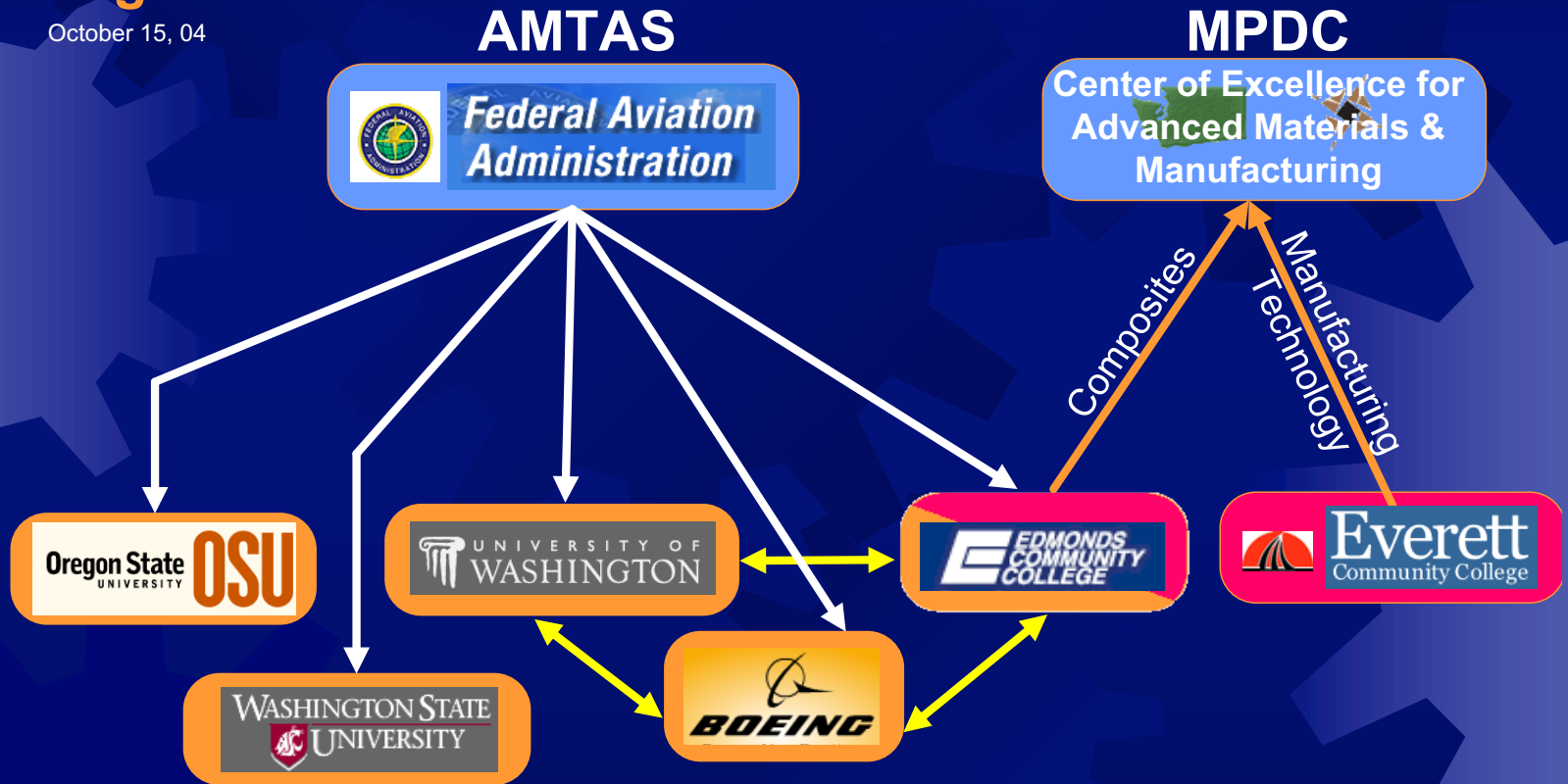


- ✦ Established in 1967
- ✦ Location: North Seattle suburbs (Lynnwood/Everett, WA locations) within 10 miles of Boeing (Everett) Campus
- ✦ Philosophy: Strength through collaboration
- ✦ Distance Learning: Started 10 years ago, with ~7,000 students enrolled in 2004
- ✦ Onsite Learning: ~11,000 students

# Edmonds Community College

## Collaboration Organizations

October 15, 04



# Curriculum-Historical Perspective

A Series of Workshops to bring Industry & Regulators together on the Issues

- ★ FAA/NRC Workshop in Wash. DC (May 18 & 19, 2004)  
*Executive review of systematic, repair, NDI & training issues*
- ★ Kickoff meeting for FAA research at Edmonds Community College to evaluate training needs (Nov. 30 – Dec. 2, 2004)  
*Continuous education (web-based training and short courses for technicians, inspectors and engineers) and 2 to 4 year programs*
- ★ FAA Workshop (tentatively set for Chicago in Sept 2005) *To review Edmonds C.C. efforts in studying available training resources versus the expanding needs and an introductory short course for technicians, inspectors and engineers*

# FAA JAMCOE Research in 2004/2005

- Study to evaluate training needs and available resources
- Create practical short introductory course (with OEM & maintenance expert insights) for technicians, inspectors and engineers
- Documented study and course materials publicly available
- Edmonds Community College course will be reviewed at the 2005 FAA Workshop
- Future activities will expand into specialty areas and standardize composite maintenance training

# Workshop Roadmap

Knowledge

Training Level

Work Shop Outcomes

Advanced/Proprietary

Advanced Training

'Parking Lot' Issues  
Proprietary Materials  
[Advanced Training]

Common  
Knowledge

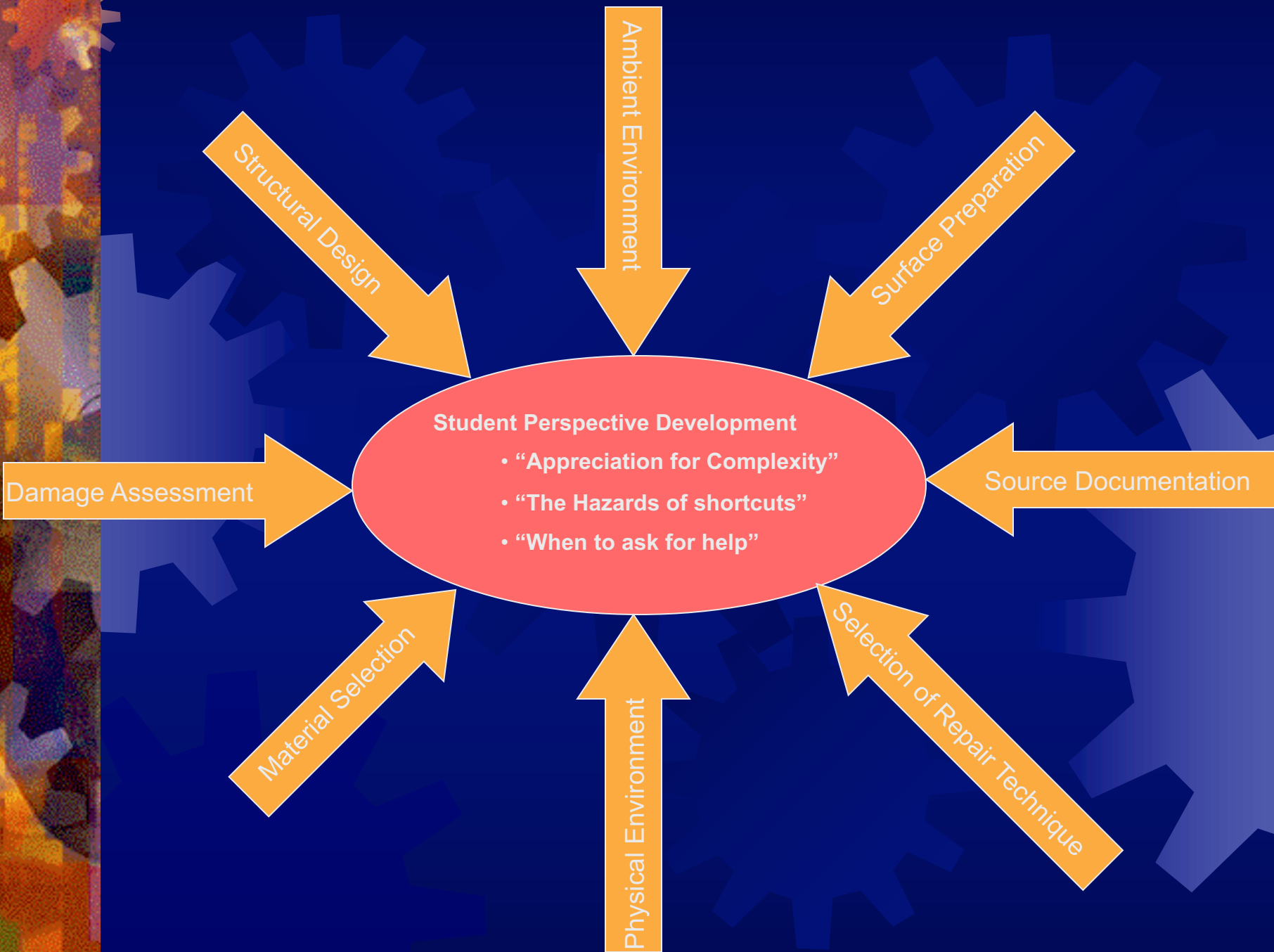
Practitioners in  
Maint. & Repair

Baseline  
Understanding  
(Maintenance  
& Repair)

'Simple Rules' for  
Technicians,  
Engineers, &  
Inspectors

Prerequisites

Increasing Knowledge



**Student Perspective Development**

- "Appreciation for Complexity"
- "The Hazards of shortcuts"
- "When to ask for help"

Ambient Environment

Surface Preparation

Source Documentation

Selection of Repair Technique

Physical Environment

Material Selection

Damage Assessment

Structural Design



# Workshop (2004) Overview

Objective: Establish fundamental baseline training for composites maintenance and repair training courses to achieve a common level of understanding

- Technicians
- Engineers
- Inspectors

Format: Three subgroups to consider unique requirements in separate breakout sessions and provide feedback & conclusions

# Workshop (2004): Vision for Training

Students at the end of the course will have a common foundation of understanding of the maintenance and repair of composite materials, preparing them for simple repairs and for more advanced training

Students will be able to:

- Use basic repair techniques (subordinate objectives TBD)
- Read and follow source documentation and procedures (subordinate objectives TBD)
- Determine selection criteria through assessment of damage for alternative repair solutions (subordinate objectives TBD)
- Mitigate technical risks (subordinate objectives TBD)

# Draft Terminal Course Objectives: As originally proposed for grant

- Identify typical in-service damage types, including source and cause of damage, for composites
- Identify different damage and repair assessments
- Identify differences in repair techniques for composite structures with particular emphasis on composite bonded and bolted repair methods
- Understand the repair process, including surface preparation, adhesive bonding, typical repairs (e.g. edge band, injected repair, potted repair), bagging and curing, post-repair and inspection to acceptance criteria, and surface restoration.

# Draft Terminal Course Objectives: As originally proposed for grant

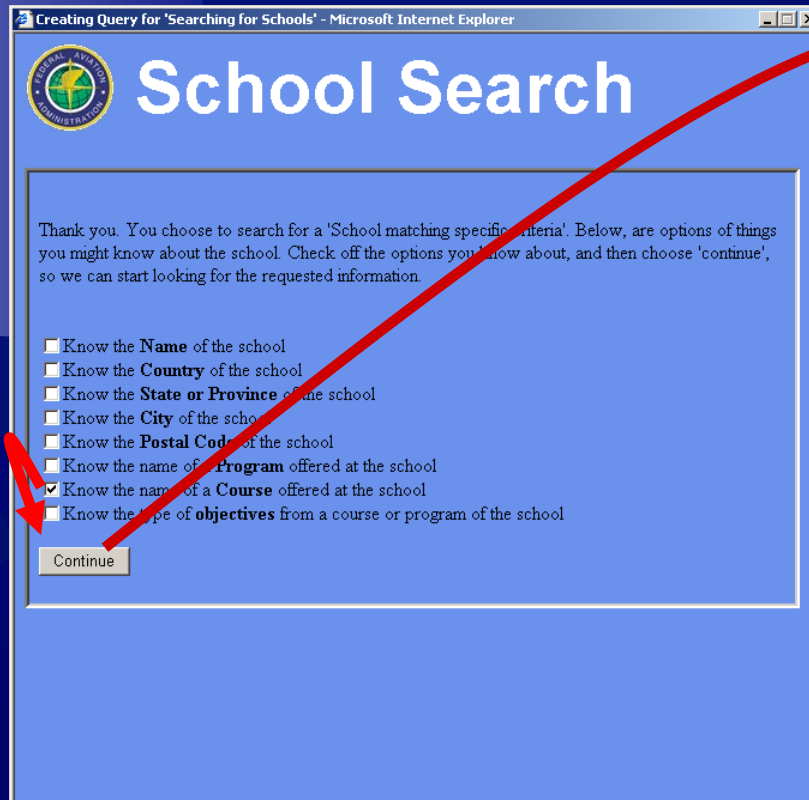
- Establish a facility for repairs (remote and permanent locations), including shop equipment, specialized repair equipment, and measuring devices
- Identify maintainability issues regarding paint removal and repainting, and bond/ground maintenance
- Utilize documentation and reference materials required for FAA certification compliance
- Understand the implication differences between secondary and primary structure damage repair

# FAA School Search


- Internet Based
- Logon Required
- Allows users to identify search criteria specific to composites technology and repair. [fig 13.1]
- Expandable to variety of disciplines
- Specific criteria details entry [fig 13.2]

Fig 13.1

Fig 13.2

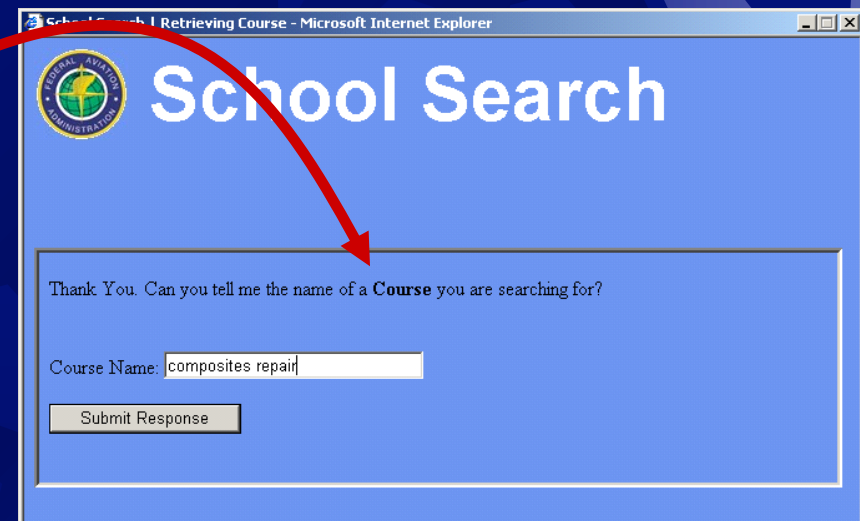


Creating Query for 'Searching for Schools' - Microsoft Internet Explorer


 **School Search**

Thank you. You choose to search for a 'School matching specific criteria'. Below, are options of things you might know about the school. Check off the options you know about, and then choose 'continue', so we can start looking for the requested information.

- Know the **Name** of the school
- Know the **Country** of the school
- Know the **State or Province** of the school
- Know the **City** of the school
- Know the **Postal Code** of the school
- Know the name of a **Program** offered at the school
- Know the name of a **Course** offered at the school
- Know the type of **objectives** from a course or program of the school



School Search | Retrieving Course - Microsoft Internet Explorer

 **School Search**

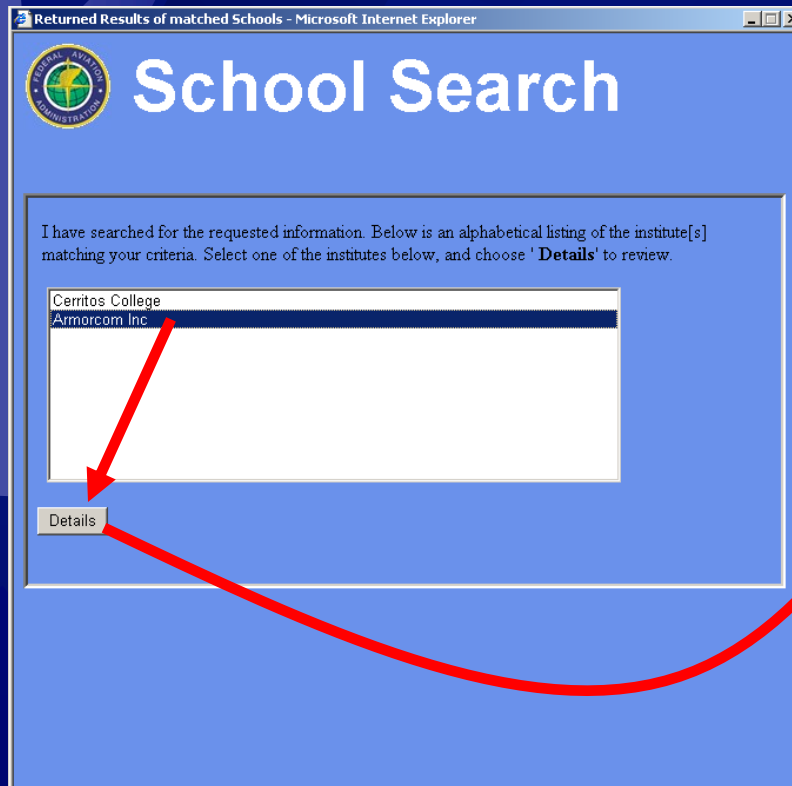
Thank You. Can you tell me the name of a **Course** you are searching for?

Course Name:


# FAA School Search

- Itemized Institute Matches [fig 14.1]
- Detailed Institute Information [fig 14.2]

Fig 14.1



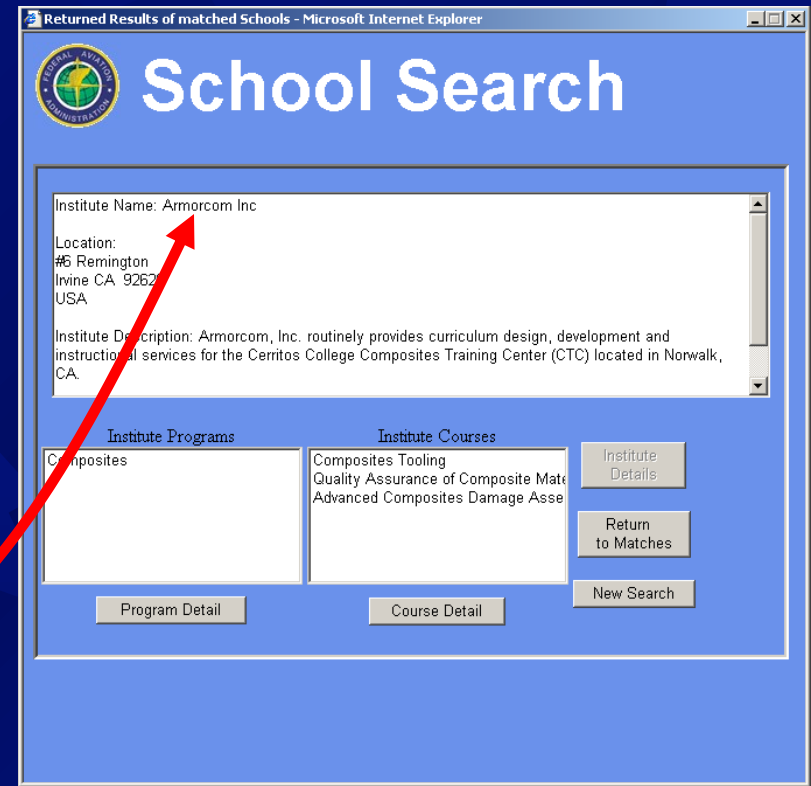
Returned Results of matched Schools - Microsoft Internet Explorer

 **School Search**


I have searched for the requested information. Below is an alphabetical listing of the institute[s] matching your criteria. Select one of the institutes below, and choose 'Details' to review.

Cerritos College
Armorcom Inc

Fig 14.2



Returned Results of matched Schools - Microsoft Internet Explorer

 **School Search**

Institute Name: Armorcom Inc

Location:  
#8 Remington  
Irvine CA 9262  
USA

Institute Description: Armorcom, Inc. routinely provides curriculum design, development and instructional services for the Cerritos College Composites Training Center (CTC) located in Norwalk, CA.

Institute Programs	Institute Courses	<input type="button" value="Institute Details"/>
Composites	Composites Tooling Quality Assurance of Composite Mat Advanced Composites Damage Asses	<input type="button" value="Return to Matches"/>
<input type="button" value="Program Detail"/>	<input type="button" value="Course Detail"/>	<input type="button" value="New Search"/>

# FAA School Search

- Detailed Program Information [fig 15.1]
- Detailed Course Information [fig 15.2]
- Demo [Beta]: [http://mpdc.biz/school\\_search](http://mpdc.biz/school_search)
  - User ID: guest
  - Password: guest

Fig 15.1

The screenshot shows a web browser window titled "Reviewing Program: Composites - Microsoft Internet Explorer". The page header features the FAA logo and the text "School Search". A text box displays the following information: "Institute Name: Amorcom Inc", "Program Name: Composites", "Program Course: Composites Tooling, Quality Assurance of Composite Materials, Advanced Composites Damage Assessment & Repair", and "Contacts: Email: design-engineering@amorcom.com". Below this, there are two columns: "Institute Programs" with "Composites" selected, and "Institute Courses" with "Composites Tooling", "Quality Assurance of Composite Materials", and "Advanced Composites Damage Assessment & Repair". To the right of these columns are buttons for "Institute Details", "Return to Matches", and "New Search". At the bottom, there are buttons for "Program Detail" and "Course Detail". Red arrows point from the "Program Detail" button to the "Program Course" list and from the "Course Detail" button to the "Institute Courses" list.

Fig 15.2

The screenshot shows a web browser window titled "Reviewing Course: Composites Tooling - Microsoft Internet Explorer". The page header features the FAA logo and the text "School Search". A text box displays the following information: "Institute Name: Amorcom Inc", "Course Name: Composites Tooling", "Course Description: \* Fully customized training is available for both on and offsite applications. Typical courses are provided in 1, 3, 5 & 10-day formats, with intensive "hands-on" instruction being the primary focus of all Comtec technical training.", "Course Objectives: Definition of Composite Tooling", "1.1 Wet Lay-Up Tooling (Polyester, Epoxy, Other)", and "1.2 Prepreg Tooling (Epoxy, Bismaleimide, Cyanate Ester)". Below this, there are two columns: "Institute Programs" with "Composites" selected, and "Institute Courses" with "Composites Tooling", "Quality Assurance of Composite Materials", and "Advanced Composites Damage Assessment & Repair". To the right of these columns are buttons for "Institute Details", "Return to Matches", and "New Search". At the bottom, there are buttons for "Program Detail" and "Course Detail". Red arrows point from the "Course Detail" button to the "Course Description" and "Course Objectives" text, and from the "Program Detail" button to the "Institute Programs" list.

# Course Development Summary

- ✓ Series of previous workshops pointed towards need for training in composite materials maintenance
- ✓ Edmonds Community College, as a partner of AMTAS, has received a grant to:
  - Develop course objectives through a collaborative workshop which will complement currently available training
  - Provide curriculum development for basic course
  - Design web-based training databases