

ADVANCED ELECTRIC DRIVE VEHICLES

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Project ID: AARRAVT039

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Overview

Timeline

- Project start date: DEC 2009
- Project end date: DEC 2012
- Percent complete: 15%

Barriers

- Obtaining Instructional Equipment and Materials from Vendors

Budget

- Total project funding
 - DOE share: \$720,358

Partners

- None



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COMMUNITY NEED/MOTIVATING RATIONALE

There is a large and currently unmet need for automotive technicians with the skills necessary to service today's vehicles.

In Virginia alone, the Virginia Employment Commission has projected 862 openings for automotive technicians per year between 2006 and 2016.

(VA Employment Commission, 2008)



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COMMUNITY NEED/MOTIVATING RATIONALE

Compounding this shortage is the fact that automotive technology is rapidly changing and many of today's technicians do not possess the requisite knowledge and/or skills to repair the newer vehicles.

With the introduction of advanced electronics, electric vehicles, plug-in hybrid electric vehicles, and fuel cell electric vehicles, there is a critical need for education in these new and emergent technologies.



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COMMUNITY NEED/MOTIVATING RATIONALE

Today's automotive service technician must know how to safely diagnose and repair an inverter capable of converting DC voltage to 600V 3 phase AC voltage. Tomorrow's technician will also be required to diagnose and repair a Polymer electrolyte membrane (PEM) fuel cell.

An extensive search of course offerings by community colleges reveals only a few offering technician-level courses in advanced electric drive vehicles.

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COMMUNITY NEED/MOTIVATING RATIONALE

Automotive manufacturers are currently the only organizations providing this advanced technology education to technicians. These manufacturers' courses are only available to technicians at dealerships that sell their products.

Virtually no education is available for non-manufacturer technicians. Hence, independent facilities, which greatly outnumber dealerships, must frequently tell their customers that they cannot repair their vehicles.



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ADVANCED ELECTRIC DRIVE VEHICLE

OBJECTIVES

Address the critical need for automotive technical education in new and emerging propulsion technologies:

- Electric vehicles (EV)
- Plug-in hybrid electric vehicles (PHEV)
- Fuel cell electric vehicles (FCV).

By developing new courses and collating them into an advanced electric vehicle Career Studies Certificate.

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SCOPE OF WORK

Develop and implement courses in the following technical areas:

- Principles of operation, diagnosis and repair of EV, PHEV, and FCV.
- Electronic control systems including sensors, controllers and other advance electronic components required for the operation of EV, PHEV, and FCV.
- Industrial safety as it applies to new and emerging technologies.

Deliverable: Development of five advanced electric drive vehicle courses.

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TASKS TO BE PERFORMED

Career Studies Certificate Curriculum:

JSRCC's Advanced Electric Drive Vehicle CSC will include the theory, application, and diagnosis of EV, PHEV, and FCV.

The CSC will be a sequence of 22 credits of which 19 will be in Advanced Electric Vehicles. The remaining course will be in humanities or the social sciences. The following courses are planned for development:

- AUT XXX "Introduction and Safety", 3 lecture, 3 credits
- AUT XXX "Electric Vehicles" 3 lecture, 3 lab, 4 credits
- AUT XXX "Plug-in Hybrid Vehicles" 3 lecture, 3 lab, 4 credits
- AUT XXX "Fuel Cell Electric Vehicles" 3 lecture, 3 lab, 4 credits
- AUT XXX "Control Electronics" 3 lecture, 3 lab, 4 credits
- Humanities/Social Sciences elective 3 lecture, 3 credits

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TASKS TO BE PERFORMED

Two courses will be developed in the first year of the grant (2010) and will focus on:
(1) the introduction and safety course and (2) the electric vehicle course.

The plug-in hybrid electric vehicle course will be developed in Year 2 (2011)

The fuel cell electric vehicle and control electronics courses will be developed in Year 3 (2012).

Each of the AUT courses will be developed in the following phases with each phase requiring approximately one semester:

- Develop course
- Develop laboratory exercises
- Pilot course in traditional classroom format
- Refine course and convert to a distance education format

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Project Management Plan

Introduction to Hybrid Automotive Technology and Safety

Develop Course	Fall 09
Develop Laboratory Exercises	Fall 09
Pilot Course	Fall 09
Refine Course	Spring 10
Offer Full Developed Course	Summer 10

- Introduction & Safety Course Development Completed
- Course is Scheduled for Summer 2010

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Project Management Plan

Electric Vehicles

Develop Course	Spring 10
Develop Laboratory	
Exercises	Spring 10 - Summer 10
Pilot Course	
Refine Course	
Offer Full Developed Course	

- Electric Vehicle Course Under Development
- Pilot Course is Scheduled for Fall 2010

	Fall10
	Spring 11
	Summer 11

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Project Management Plan

Plug-In Hybrid Vehicles

Develop Course	Fall 10		
Develop Laboratory			
Exercises	Spring 10		
Pilot Course		Summer 11	
Refine Course		Fall 11	
Offer Full Developed			Spring 12
Course			

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Project Management Plan

Fuel Cell Electric Vehicles

Develop Course	Summer 11	
Develop Laboratory		
Exercises	Fall 11	
Pilot Course		Spring 12
Refine Course		Summer 12
Offer Full Developed		Fall 12
Course		

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Project Management Plan

Control Electronics

Develop Course	Summer 11	
Develop Laboratory		
Exercises	Fall 11	
Pilot Course		Spring 12
Refine Course		Summer 12
Offer Full Developed		Fall 12
Course		

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Project Management Plan

Summary of Accomplishments

- Completed development of Hybrid Introduction & Safety course.
- Purchased instructional equipment for Hybrid course.
- Hybrid course is scheduled for Summer 2010
- Initiated development of Electric Vehicle course.
- Initiated purchasing of instructional equipment for EV course.
- EV course pilot Scheduled for Fall 2010

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Questions?