ME 495P Design Proposal

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Design Problem

The 1999 Ford Ranger EV contains a battery pack that provides 312 V to power the vehicle. Replacement batteries are no longer available for owners of this vehicle. A conversion kit is needed to allow replacement of the existing batteries with off-the-shelf deep cycle batteries capable of powering the vehicle. The batteries must fit in the existing case and be compatible with the existing controller.

Previous Work

Work on the design of an alternative battery pack was conducted during the Autumn quarter of 2004 in conjuction with ME 395 under Professor Joyce Cooper. The group focused on designing a new battery pack that could be installed into the vehicle. The first phase of the design was selecting an off-the-shelf deep cycle battery. The group selected deep cycle Optima d31a batteries. Twenty six of these batteries will provide the 312 V necessary to power the vehicle. The next phase of the design was a conceptual design of the new battery case and arrangement of the batteries. A conceptual design of the case was created utilizing the existing battery case mounts and space available in the vehicle.

The selection of the above design was based on an iterative process. The process began with a product design specification and analysis of customer requirements. The requirements developed were analyzed with a QFD and functional decomposition. Details of the process and results of alternative solutions are available at http://students.washington.edu/njs/395home.shtml.

Proposed Work

The deliverable item for this project is a conversion kit and instructions for replacing batteries in a 1999 Ford Ranger EV. The kit should utilize the existing case and computer interface with off-the-shelf batteries. The first phase of the project will be selecting acceptable batteries capable of

providing the necessary power to move the vehicle. The selected batteries must be able to fit in the existing case in a safe and functional arrangement. Range of the vehicle can be sacrificed, if neccesary, to facilitate implementation of the new batteries. The second phase of the project will be determining the necessary modifications to the controller to recognize and function with the selected batteries. Selection of new batteries may result in fewer batteries in the battery pack. Controller modifications will be needed to account for cells of the current design not used in the new design. The next phase of the project will be to determine modifications necessary to the case to house and secure the new battery configuration. The final phase of the project will be the creation of the instructions and packaging of the kit, to include a business plan for manufacture of necessary components and distribution of the product.

Timetable and Task Assignments

The following provides the timetable and tasks anticipated for completion of this project.

Task	Due Date	Assigned Responsibility
Seattle EVA Meeting	1/11/05	Stutesman
Safety meeting with Russ Noe	1/11/05	Group
Design Proposal, Safety Plan and Presentation	1/13/05	Lancaster
Contact information for EV maintenance	1/13/05	Thomas/Williams
Possible battery choices	1/14/05	Stadnicky/Stutesman
Battery choice evaluation	1/23/05	Group
Battery selection	1/25/05	Group
Determine battery configuration	2/1/05	Cooper
Midterm report	2/10/05	Group
Generate instructions and business plan	2/14/05	Lancaster/Stadnicky
Obtain batteries	2/22/05	Thomas/Williams
Oral Presentation	3/10/05	Group
Final Report	3/11/05	Group

This was the original design proposal, so the timeline changed as we gathered more information and ran into obsticales.