

IPRO 342

Spring 2006

Hybrid Electric Vehicles: Simulation, Design and Implementation

Objectives:

The purpose of IPRO 342 was to design and simulate an electric hybrid CTA bus and a school bus using a software package called ADVISOR. Their performance as well as fuel economy was studied.

Organization:

The IPRO 342 team was split into 2 main groups for the semester. These included the CTA Bus group and the School Bus group. The CTA Bus group worked on a retrofit design while the School Bus group worked on a retrofit, a new and an ISA design. Each group was then divided into 3 subgroups and these were the ADVISOR team, the mechanical team and the electrical team.

Accomplishments:

The whole team conducted extensive research at the beginning of the semester to understand the different designs and learn about hybrid electric vehicles in general. The two main designs for HEVs are parallel design and series design. The team decided on the parallel design because it is easier for retrofit. The ADVISOR teams learned to use the software and came up with the hybridization coefficient through simulation of the conventional and new designs. They used different drive cycles to make sure the results were compatible. The electrical teams studied the different types of batteries and motors used in hybrid vehicles and chose the ones better suited for each design. The mechanical teams came up with the drivetrain 3-D models for the conventional and the hybrid designs. After the final results were achieved, both groups conducted a cost analysis and concluded that the projects were successful and that HEVs lower the fuel costs and emissions.

Future Work:

The main goal for the following IPRO is the optimization of hybridization factors and the practical implementation of the proposed models. Also a written proposal to the "City of Chicago" about the retrofit of CTA buses is planned.

Team Members:

CTA group

Ana Martin (EE) - Leader
Shameek Ghosh (Grad)
Robert Fleming (ME)
Dan Folwaczny (AE)

School Bus group

Pradeep Shenoy (EE) – Leader
Jasmine Vadgaama (Grad)
Kevin LoCascio (ME)
Jose Hernandez (AE)

Jae Suk Lee (EE)
Alexander Warner (EE)
Dipti Sharadendu (EE)

Taekmin Oh (EE)
Priscilla Mulhall (EE)
Sapna Patel (MBB)