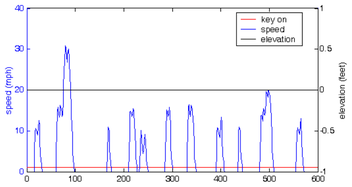
Hybrid Electric Vehicles IPRO 342

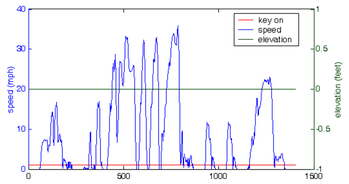
Simulation, Design and Implementation

http://www.iit.edu/~ipro342s06/index.html

CTA BUS

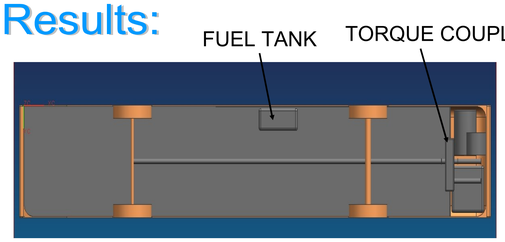


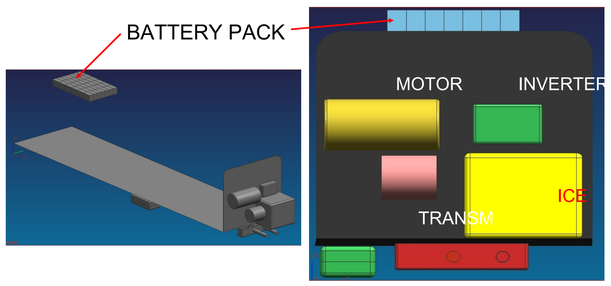
NY Transit Bus Drive Cycle

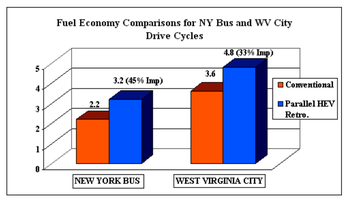


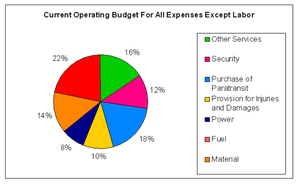
West Virginia City Drive Cycle

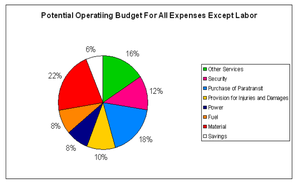
Results:











CTA Bus Team:
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Kevin Locascio
Jose Hernandez
Taekmin Oh
Pricilla Mulhall
Sapna Patel

Instructor: Sheldon Williamson

Professor: Dr. Ali Emadi

SCHOOL BUS

Goals and Objectives:

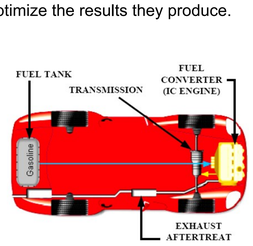
- **Conventional Simulations of the CTA Bus and School Bus**
- **Parallel Retrofit Design and Simulation of the CTA and School Bus**
- **Parallel New Design and Parallel ISA Designs and Simulations for the School Bus**
- **Drivetrain 3-D Models for the Conventional and Hybrid CTA Bus and School Bus**

Using ADVISOR:

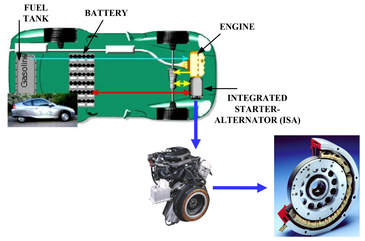
At the core of IPRO 342 is ADVISOR, an acronym for **Ad**vanced **V**ehicle **S**imulat**or** for systems analysis.

ADVISOR is complete with files containing information about different vehicles and their layouts, components, and weights.

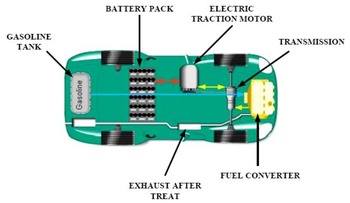
This software allows us to simulate our different designs for the buses and optimize the results they produce.



Conventional Drivetrain

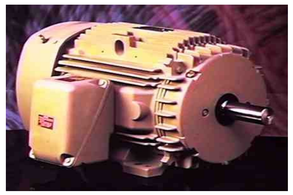


Parallel ISA Drivetrain



Parallel Drivetrain

Hybrid Components:



- **3-phase; 460V; 100 HP; 60 Hz; 3600 RPM.**
- **Full Load Current = 109 Amperes.**
- **Total Weight = 1480 kg.**

Model: General Motors AP 902

Picture Courtesy General Electric Co.

Model: Odyssey PC 2150

Picture Courtesy West Coast Batteries, Inc.

- **12V Module; Short Circuit Current > 5000 Amperes.**
- **Capacity = 100 Amp-hours; Weight = 75 lbs.**
- **Designed Life = 12 yrs.**

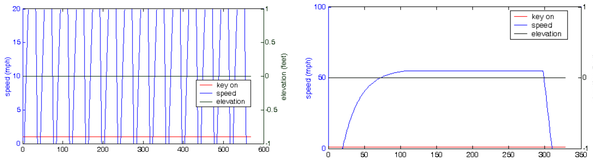
Model: Saminco M1-250

Picture Courtesy Saminco, Inc.

- **Voltage Range = 450V (min); 900V (max).**
- **Power Rating = 250kW @ 460V.**
- **S/W Frequency = Up to 10 kHz; Temp = -40 to 105 ºC.**

Conclusions and Future Work:

- **Cost effective solution: Cost of hybridization = $3000; Payback = 1 – 2 years**
- **Hybrid CTA Bus: Achieved between 35 – 45% fuel economy improvement**
- **Hybrid School Bus: Achieved between 45 – 70% fuel economy improvement**
- ***Future*: Optimization of hybridization factors**
- ***Future*: Practical implementation of the proposed models**
- ***Future*: Strong proposal to the "City of Chicago"**



CBD-14 Drive Cycle

Commuter Drive Cycle

Results: