

SAE Oral Presentation

South Dakota School of Mines and Technology
Alternative Fuel Vehicle Team



Our History

- 2007 SAE CSC
 - Built first prototype
 - Served as springboard for present model



- Hydrogen Powered Vehicle
 - Utilized Nexa Power Module by Ballard
 - Prototype created

Our Goals

- Create an electric snowmobile to compete in the Clean Snowmobile Competition for 2008
- Keep the snowmobile as close to stock as possible
- Have performance characteristics that is practical for the requirements of the competition
- Maintain safety throughout the entire project

Our Approach

- A decision matrix was used to base the design criteria
- Place a higher importance on performance over range
- Make it easily upgradeable for future competitions

Topics	Ranks
Safety	1
Performance	2
Range	3
Reliability	4
Weight	5
Cost	6
Availability	7
Appeal	8

Snowmobile Operator Perspective

- Appeal
 - Appearance will be kept close to factory look
 - This gives a familiarity to the rider

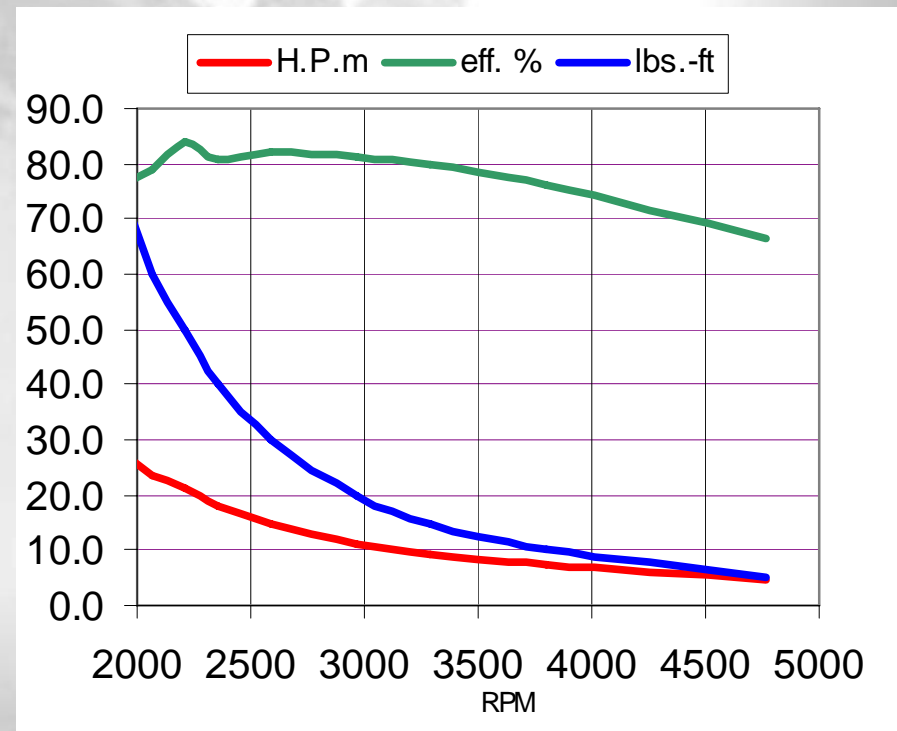


- Ergonomics
 - Original rider position was maintained
 - All controls are located in a similar position as stock

Snowmobile Operator Perspective

Performance

- Electric motor is capable of 70 ft-lbs of torque at 72 volts
 - This produces adequate acceleration
- P-90 CVT allows for efficient power transfer to the final gear ratio of 5.4:1 which allows for a top speed of 25 MPH
- Motor controller is rated at 450 amps at 72 volts which is giving the full use of the battery pack potential



Snowmobile Operator Perspective

Handling

- Weight of the snowmobile is 770 lbs which still allows for maneuverability
- Center of gravity is behind the bulk head giving the driver expected handling results
 - Rear Torsion Springs were given a tighter pretension to compensate for the weight of batteries

Serviceability

- Low maintenance system
- Easy to service

Dealer/Outfitter Perspective



- Durable
 - Low maintenance
 - Electric equipment has a long life
- Simple Operation
 - A novice can use with little training
 - All controls are located in the typical position
- Rider Comfort
 - Ergonomics maintained to that of a stock snowmobile

Environmental Perspective

- Emissions cause the following
 - Acid Rain
 - Global Warming
 - Air Pollution
 - Expanding government regulations require a cleaner solution
- Electric is the solution
 - Utilizes cleaner form of energy
 - Power Plants provide energy
 - Alternate forms of power production reduce emissions all-around

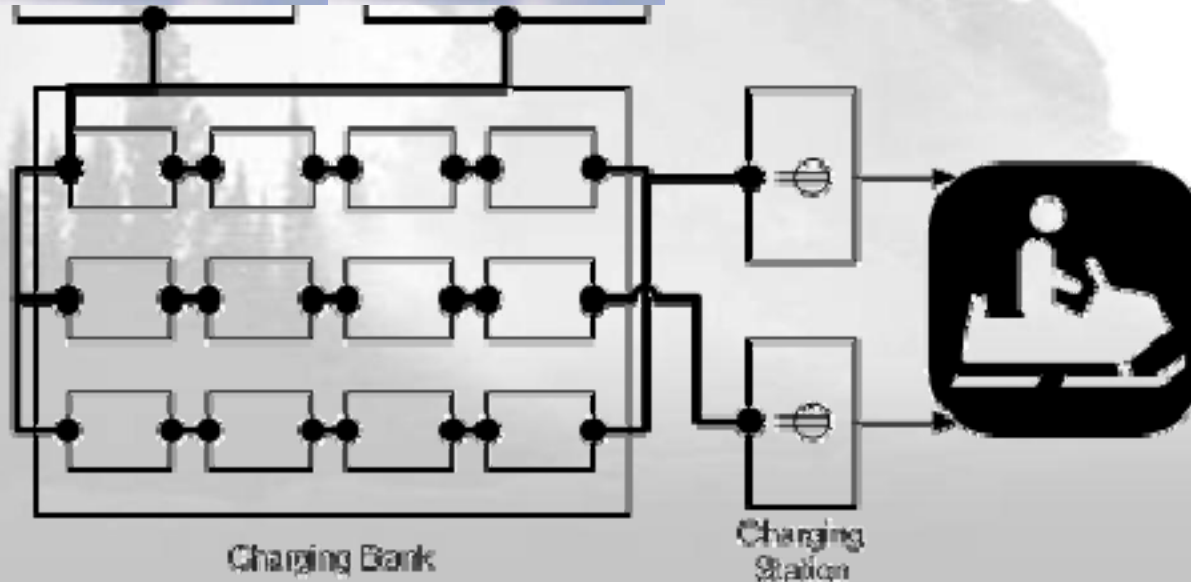


Environmental Perspective

- Noise is a major issue with snowmobiles
 - Common snowmobile produces 82dB at 50 ft*
 - Noise pollution is an annoyance to others utilizing the same wilderness areas
- Electric is virtually silent
 - The majority of the noise is emitted from the track and CVT
 - Electric motor noise is similar to a small household fan



Our Future



Questions???



Thank-you

The SDSM&T AFV team would like to acknowledge the many sponsors who helped to make this project a reality. A special thanks for the resources found in the Center for Advanced Manufacturing and Production (CAMP) and in the Composite and Polymer Engineering (CAPE) Laboratory. Also to the teams advisors, Dr. Batchelder and Dr. Dolan, and to the many other faculty who offered expertise. The team also thanks Net Gain Technologies and Alltrax for their top of the line technologies and expertise. Thanks also to other local sponsors:

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