2010 SAE Clean Snowmobile Challenge Parade lap on the objective handling course.

What is the CSC?

- The newest competition in the SAE International collegiate design series. Others include Formula SAE, Baja and others.
- Challenges engineering students to improve on existing snowmobiles to reduce emissions and noise and improve public perception.
- Events include: emissions bench test, in-service emissions, noise, handling, static display, cold start, endurance run, range, draw bar pull, acceleration.
- Hosted by Michigan Technological University, Keweenaw Research Center past eight years.
- I serve as a technical inspector, judge and sit on the rules committee.

CSC History

- Began in 1999 in response to conflicts over snowmobile use in Yellowstone N.P.. Held in Jackson Hole, Wyoming first four years.
- Moved to Michigan Tech/KRC in 2003
- NSF became a major sponsor in 2008
- In 2010, 17 teams competed (5 ZE)
- The winning ZE team is offered the chance to send one team member and their machine to Summit Station.

There are big teams



There are little teams



16 Teams Finished – That's a lot of students!



Niche Applications for Zero Emissions

- Allows atmospheric and snow photochemistry scientists to access their sampling sites with ZE machines.
- Several spin-offs on the IC side, including catalytic exhaust after-treatment and oxygenated fuel.
- ZE machines may well fit the needs of Alaskan villages, where fuel prices are prohibitive.
- Other potential applications at ski areas especially in Europe, where regular snowmobiles are becoming increasingly banned.
- Electric motors are unaffected by altitude.

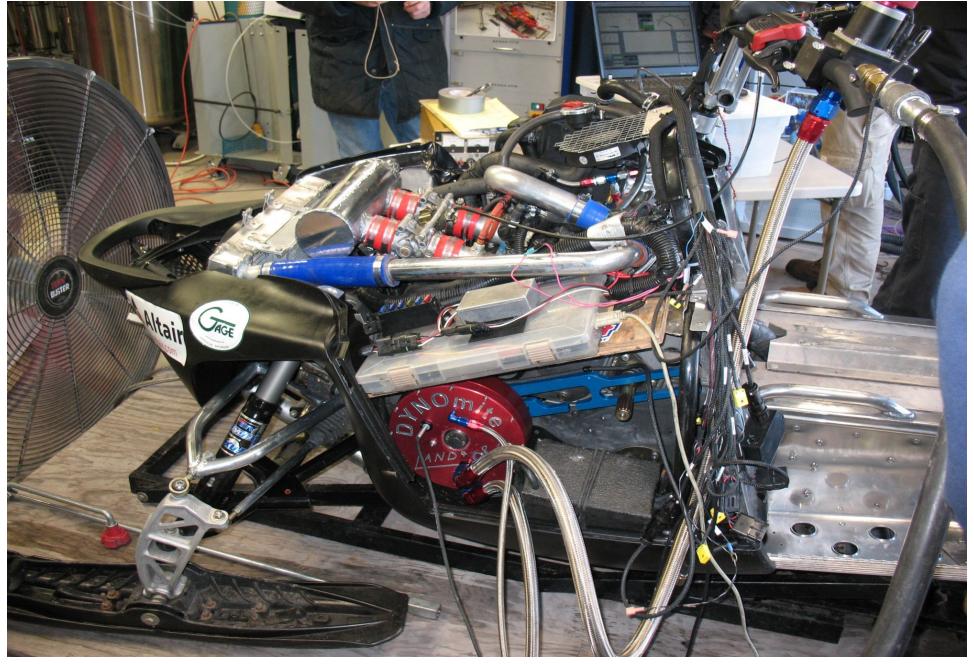


Electric Snowmobile At Summit

Dramatic performance improvements over the years:

- -Up to 20 mile range
- -Up to 75 mph top speed (de-tuned for Summit)
- -High availability

Bench Emissions Testing



In Service Emissions Space Pod



In Service Emissions Testing



Sound Testing



Acceleration Event



Objective Handling



Draw Bar Pull



Acceleration With Load



This was supposed to be a combined range + load + handling event. The lack of snow made us come up with creative ways to demonstrate the ZE machines great utility functions, while keeping it interesting and fun.



New Challenges Every Year

- 2008/E20: 20% Ethanol, an oxygenated biofuel
- 2009/Flex Fuel: Engine controls had to recognize the fuel and alter mapping.
- 2010/Fuel Efficiency: The winning machine got almost 23mpg in truly poor snowmobiling conditions.
- 2011 Maybe wheels?????

A few challenges for organizers too!



U of Wisconsin – Madison: 1st Place ZE



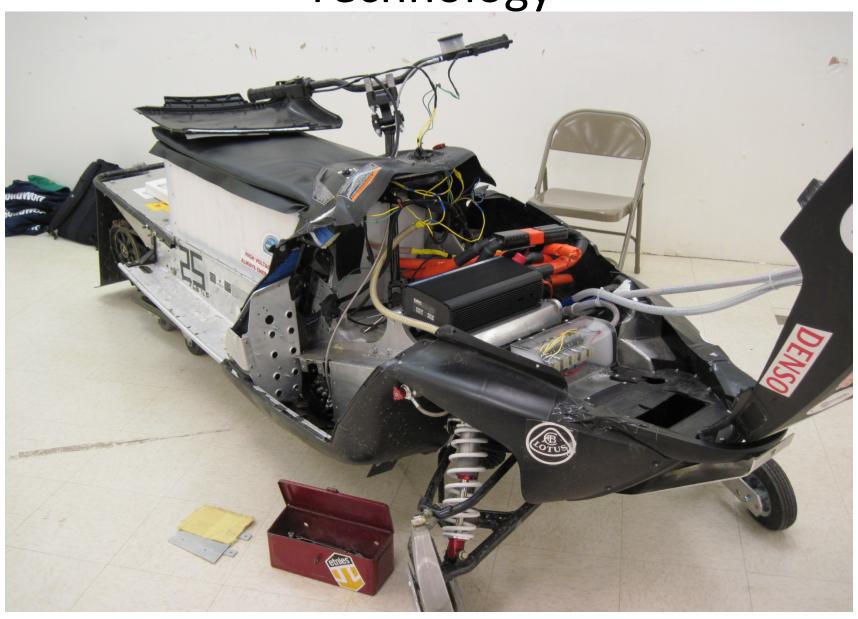
Clarkson University: 2nd Place ZE



McGill University: 3rd Place ZE



South Dakota School of Mines and Technology



University of Alaska - Fairbanks



Innovation Award: SUNY-Buffalo



University of Idaho: Best Handling



NSF Polar Programs & Summit Station

