NIAATT

TECH BRIEF

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MARCH 22 Breaking News from the 2003 Clean Snowmobile Challenge: The UI Clean Snowmobile Team has won first place overall in the competition, for the second year in a row! Go UI!

UI Clean Snowmobile Team Helps Design Environmentally Friendly Sleds

Snowmobiling in national parks, national forests and other public lands in the US has become the subject of heated controversy in recent years. One instance concerns the use of snowmobiles in Yellowstone National Park. By the year 2000, visitors were making about 75,000 snowmobile trips into Yellowstone during the park's 100-day winter season. The increasing air and noise pollution caused by these popular machines has prompted debate among environmentalists, government agencies, and snowmobilers on whether the machines should be allowed in national parks at all.

Stringent regulations on snowmobiles in Yellowstone have been enacted recently, and the industry is under pressure to produce snowmobiles that are cleaner, quieter, and more environmentally friendly, while retaining the performance features that riders love so well. The University of Idaho Clean Snowmobile Team is taking part in a nationwide student competition to design these new generation, environmentally friendly snowmobiles.

The UI Clean Snowmobile Team's sled won four events, placed second in three more events, and tied for first place overall at the 2002 Clean Snowmobile Challenge, held last year in Jackson Hole, Wyoming.

The University of Idaho's Clean Snowmobile Team is gearing up to compete again in the Society of Automotive Engineers' (SAE) Clean Snowmobile Challenge, to be held March 19-23, 2003, in Houghton, Michigan.

This national collegiate design competition challenges teams of engineering students to re-engineer a current model snowmobile for improved emissions, efficiency, and noise levels.

Teams from fourteen schools across the country will compete in the 2003 Challenge, hosted this year by Michigan Technological University.

Throughout the week-long competition, the student teams and their sleds will face off in a wide range of categories: emissions, fuel economy/endurance, noise, acceleration, handling/driveability, cold start, and brake testing. Each team is also required to submit an engineering design paper detailing their work and give an oral presentation on their designs.

Continued on next page

Sponsored by NIATT's Center for Clean Vehicle Technology, the UI team has competed in the Clean Snowmobile Challenge for the past two years. In its first year, 2001, the team's sled performed well, but finished fifth overall because its sound emissions were slightly above the competition's maximum permissible sound level.

The team came back in a big way for the 2002 competition, though, winning Best Fuel Economy, Best Performance, Best Design, the World Championship Hill Climb, and tying with Kettering University for first place overall. The UI team also took second place in emissions, sound reduction, and acceleration.

UI 2002 Clean Snowmobile Team members pose with their awards and their winning machine, the green Arctic Cat SnoPro (left), which they'll also enter in the 2003 competition. On the right is the red Polaris 440 ProX snowmobile that they plan to modify for the 2004 competition.

Post-competition emissions testing places UI sled as cleanest

Following the 2002 competition, the top five finishers in the emissions portion of the competion were invited to take their snowmobiles to the prestigious Southwest Research Institute (a certified emissions testing laboratory) in San Antonio, Texas, for more extensive emissions testing. Two student machines were tested, UI and Kettering University's, along with two commercially available four-stroke snowmobiles. "The bottom line is that UI's sled was the cleanest one tested," said Karen Den Braven, the team's faculty advisor. "Ours had lower emissions than the other student sled and both of the commercial ones."

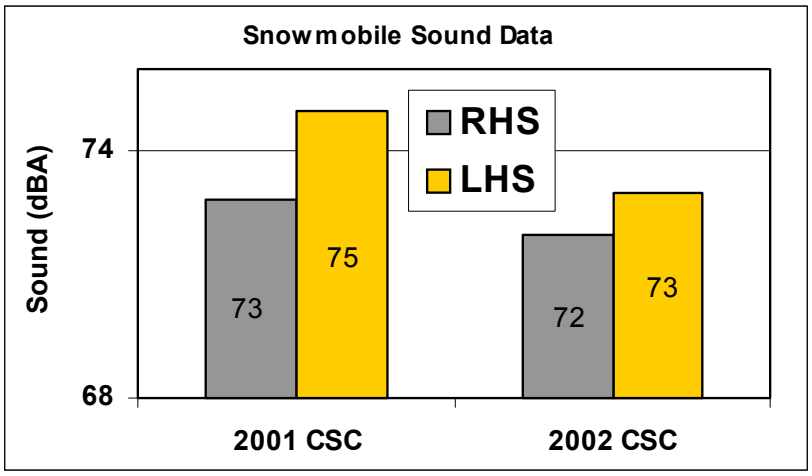
The UI winning machine

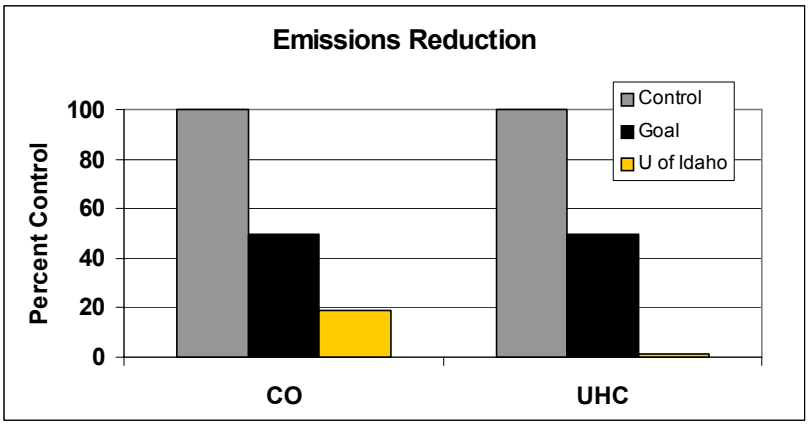
The UI team's winning machine is an Arctic Cat SnoPro retrofitted with a four-stroke engine. Snowmobiles typically come from the factory with two-stroke engines, which are louder than four-stroke and release substantially more unburned hydrocarbons and other pollutants. For this project, the UI team purchased a SnoPro chassis only, without an engine. They then installed a BMW 750cc four-stroke motorcycle engine, and added electronic fuel injection and a catalytic converter**.** This required a series of adjustments to the engine, transmission, exhaust system, fuel system and electrical systems.

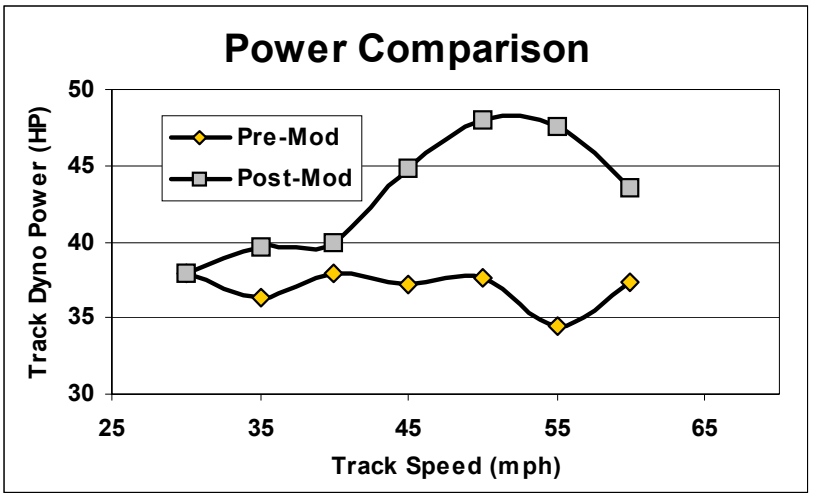
In addition to impressive sound and emissions improvements in the 2002 competition, the UI team's machine demonstrated a 56 percent improvement in fuel economy over the control sled. (*See the graphs illustrating Sound, Emissions and Power testing results on the next page*.)

"The Clean Snowmobile Challenge has had a major impact on the development of emissions regulations for U.S. snowmobiles, and, by showing us what's possible, the students have impacted snowmobile emissions and efficiency worldwide."

Howard Haines, Bioenergy Engineer, Montana Department of Environmental Quality







Test results for the UI snowmobile from the 2002 Clean Snowmobile Challenge

2003 Clean Snowmobile Team Members

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Wasilla, Alaska
Todd Freeman
Senior, Mechanical Engineering
Cascade, ID
Nate Wasankari
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Students rewarded for entries that are practical as well as manufacturable

The Clean Snowmobile Challenge encourages students to design a snowmobile that is not only clean, quiet, and environmentally friendly, but that is also practical and economical to produce.

To test the practicality of their designs, students compete in two additional categories that address each entry's costs vs benefits: the Most Practical Solution award is presented to the team with the best balance between cost and measured noise and emission reduction. The Best Value award is presented to the team with the best balance between cost, fuel economy, and performance. The UI machine came in second in both of these categories during the 2002 competition.

Real-world challenges, real-world solutions

The Clean Snowmobile Challenge's emphasis on practical solutions to engineering problems provides students with an outstanding educational opportunity. "It's all about education," said Don Ableson, SAE Foundation President. "This event provides students with real-world challenges and requires them to work as a team to find solutions. It gives them valuable experience that today's corporations are looking for in their workforce."

Team member Scott Wemhoff agrees. "It's a great opportunity to work on a project as part of a big team," he said. "The CSC team is made up of about 20 people, and they all contribute something different to the project. It's a really good experience."

The Clean Snowmobile project offers students other benefits as well. "One of the reasons I like working on the Clean Snowmobile Team is that we get to see the science behind our work," said team member Nathan Bradbury.

"I've been working on engines in the garage all my life," he said, "but here we have the equipment to gather test data on the machine and see the quantitative results of the improvements we've made. That's learning."

Some of the 2003 CSC team members make last-minute adjustments to their sled for this year's competition. (Left to right): Nathan Bradbury, Scott Wemhoff, Nate Wasankari, Forrest French, Dana Wenstrom.

- ***University of Idaho Clean Snowmobile Team website : http://www.uidaho.edu/~uicsc/***
- ***SAE Clean Snowmobile Challenge Official website: http://www.sae.org/students/snow.htm***