

SAE Snowmobile Drivability

Note: Due to large enrollment in the department, the loss of faculty and financial constraints, students working on the competition projects must participate in the team prior to senior year. This year the SAE Clean Snowmobile will not be attending the competition. However a demonstration event at the state or even national level will be used for outreach and evaluation.

The need:

Snowmobiling is an important part of the Maine economy. One study calculated that the sport provides more than 3000 full time equivalent in the state. While the modern snowmobile is a dramatic improvement in noise and emissions than machines from only a decade ago, they still represent a significant source of pollution in often pristine areas. The use of ethanol blend in the fuel has also presented problems for snowmobiles used in forest service and rental operations due to condensation and the resulting negative impact on pollution.

The key project design objective:

The goal of this project which builds on more than a decade of UMaine participation in the competition is to design and build a compressed natural gas (CNG) powered snowmobile. Based on a new Arctic Cat snowmobile the natural gas powered snowmobile was completed by the 2013-14 team. During the 2014-15 year the engine conversion problems were investigated. This year the challenge will be to turn an idea into a project which can be used under practical conditions. The primary non-engine related issue is drivability, in particular handling and vehicle dynamics but also including noise vibration and harshness (NVH). These two factors will determine if the vehicle can be used in a practical demonstration.

Who is the final customer for this device;

The projects definition is based on the Society of Automotive Engineers (SAE) rules for the Clean Snowmobile Competition (CSC). The customer and application of the snowmobile is defined by the rules. However, after two years of discussion it appears that we will not be allowed to participate in the competition. This issue will be addressed if the team can produce a fully operational vehicle within the constraints of the rules.

Who will be supervising and evaluating the outcome of the project:

The primary oversight of these projects will come from the review of the design by a panel which will be developed for the UMaine team. The judges input will be considered as a part of grading and evaluation. However, since the project must be operated on snow well before the end of the term, improvements to both the written document and the design will continue after the operational judging has been completed. Due to the cost of the project an additional outcome will be the demonstration of the operational snowmobile at least two public events.

UMaine Mechanical Engineering technical contact point:

Professor Peterson will provide primary oversight on the goals and objectives of the project. Additional technical support will come from other faculty in the other relevant technical areas.

Core Mechanical Engineering classes required as background:

- Thermodynamics
- Design I and II
- Chemistry

Resources available:

Extensive build and test facilities are available in Crosby Lab. Infrastructure includes an engine test cell, engine dyno, chassis dyno as well as additional build and test area. A trailer is available for hauling the sleds as well as a support sled. Fabrication and assembly areas are available. Basic software is available for analysis

End of year deliverables:

A CNG powered snowmobile which can complete all of the events of the SAE Clean Snowmobile Competition. The team must participate in a professional and successful manner in at least two high profile events in Maine or on a national level.