Land Drone Dyno

The need:

The Canadian border with the United States is the longest shared land border in the world. While the US and Canada are close allies and share many values the integrity of the border remains important for both countries. A large number of policies ranging from import tariffs to immigration policy differ between the two countries. Maintaining the integrity of this border is critical to the implementation of these national policies. However, much of the border, particularly on the US side is quite remote and inaccessible. Patrolling the border is expensive and if done from the air can be ineffective because of heavy tree cover and the need to maintain constant monitoring the small monitored area on the border. Most importantly, patrolling of this type of border can present significant safety issues for agents assigned to certain areas. A land drone that could deal with the complex terrain using low cost components would meet cost objectives while providing an effective presence on the border. The ability to respond on the ground to indications from airborne or stationary monitoring systems would close gaps in coverage due to tree cover and distance between ground based sensors.

A 2.0 liter diesel powered autonomous robot.
http://www.speednik.com/files/2014/01/Untitled-4.jpg

This is not an original idea (http://www.newsweek.com/2014/07/18/time-start-worrying-about-ground-drones-258048.html) but is one which is seeing less western innovation. However geography in Russia makes them a leader in this area (http://www.dailymail.co.uk/sciencetech/article-2544534/Russia-takes-Google-Photographs-amphibious-drones-suggest-country-developing-robotic-ground-army.html) just like Maine could be a leader in the west.

The key project design objective:

There is a need for in lab testing of the land drones used for the competition. This dyno will not only match the inertial loading of the devices with a flywheel but must also provide resistance. Ideally some ability to match terrain needs is desirable. Since the land drone uses a gasoline engine it will also be necessary to design an exhaust extraction system. This is a vehicle dyno however, not an engine dyno.

Who is the final customer for this device;

This system will be used by all of the land drone teams for testing of their systems. This is an infrastructure project which will be available for students in future years.

UMaine Mechanical Engineering technical contact point:

Professor Peterson will supervise the mechanics, materials and manufacturing issues related to the project evaluation of this project. Mr. Abbadassa will provide oversight on the testing and construction of the machines.

The core Mechanical Engineering classes required as background for the project:

Controls
Design I & II
Dynamics

Strength of Materials
Material Science

Resources available:

This project is unique in that a wide range of people and equipment can be provided for the project. The design, build and test equipment used for the project is available in Crosby Laboratory.

End of year deliverables:

The final project will be used for the open house to demonstrate the performance of the land drones that will be competing in the 2016 competition.