



Title: Powertrain Architecture Trade Tool for Tracked Combat Vehicles

Authors:

Michael Sprengel, PhD., Czero, Fort Collins, Colorado

Ram Krishnamachari, PhD., General Dynamics Land Systems, Sterling Heights, Michigan

Guy Babbitt, PhD., Czero, Fort Collins, Colorado

Mike Honaker., General Dynamics Land Systems, Sterling Heights, Michigan

Abstract:

Developing updated vehicle platforms is a key modernization priority for the US Army. Central to this effort is determining the optimal powertrain architecture which will enable and support the next generation of battlefield technologies. The demand for electrical power generation on ground vehicles has grown continuously over the years as a result of more ancillary components that operate electrically. Consequently, electrification is certain to be a central focus of the next generation vehicle platforms. While future electrical demands could potentially be met by simply incorporating a larger generator into a conventional powertrain, forming a hybrid architecture by tightly integrating the electrical system with the powertrain has the potential to also significantly improve mobility performance and efficiency with optimal use of space, weight and cooling.

Over the last several decades there have been substantial advances made in hybrid powertrains for the on-road segment. However, the requirements and operating characteristics of ground combat vehicles are sufficiently different that the preferred architectures in the on-road segments may be ill-suited for the next generation combat vehicle platforms. To address this uncertainty, Czero and General Dynamics Land Systems have developed a powertrain architecture trade tool in MATLAB/Simulink for evaluating hybrid powertrains in tracked ground vehicles and for shaping the next-generation hybrid powertrain development paths. This trade tool automatically evaluates each of these architectures over a wide range of static and dynamic performance criteria while also applying a combinatorial component sizing study to reduce the impact of component selection on system performance. Data reduction/visualization routines have also been incorporated into the tool to aid in interpreting the results.

In this presentation the authors will discuss the approach and methods used by the trade tool as well as briefly discuss the results for a reference application.

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