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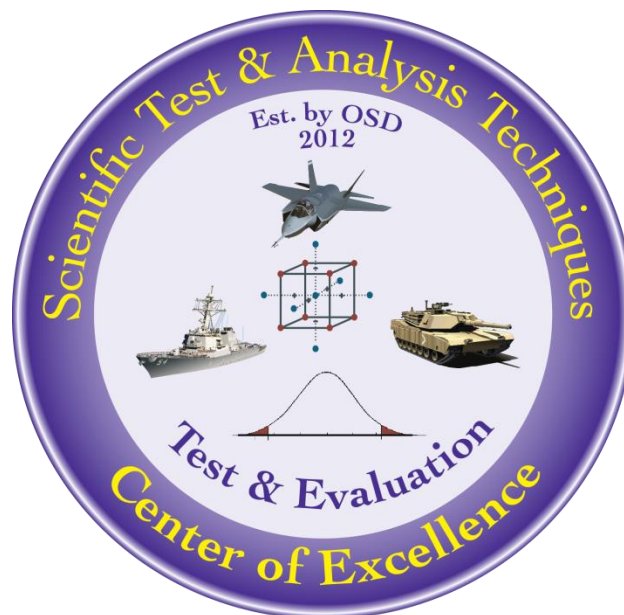
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# Split-Plot Design of Experiments: Mortar Vehicle Ballistic Similitude A Case Study

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*Authored by: Michael Harman*

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## Executive Summary

This case study deals with two military vehicles equipped with the same mortar, the existing M1064 and the new Armored Multipurpose Vehicle (AMPV). While the vehicles and integration are different, the mortars are not and the test team wants to know if the vehicle/mortar combinations are ballistically similar, meaning the existing firing tables can be used for the AMPV. The strategy is to conduct mortar fires from both vehicles during a single test and measure and compare the impact accuracy at the targets. The original plan involved 150 firings across 3 azimuth and elevation values and 5 charge values. This process will use the same factors and levels, but employs design of experiments (DOE). Using a DOE approach improves the situation because of the ability to determine the statistical significance of factors, the ability to model the response while dealing with constricted randomization, and requires fewer points. Initially the team needs to screen for vehicle significance to the response. A statistical difference will require the AMPV to fire additional rounds of significant number to calculate new firing tables. The Firing Table design will contain some redundant points from the screening design. This paper describes the process to produce a combined design that does not repeat points unnecessarily. More broadly, this method can be applied to other systems requiring a similar comparison. The designs are available in native format by emailing [COE@AFIT.edu](mailto:COE@AFIT.edu).

Keywords: mortar vehicle, factor comparison, screening design, sequential design, hard to change

## Introduction

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