

EVALUATION OF SOLID ROCKET MOTOR COMPONENT DATA USING A COMMERCIALY AVAILABLE STATISTICAL SOFTWARE PACKAGE

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ABSTRACT

Commercially available software packages today allow users to quickly perform the routine evaluations of (1) descriptive statistics to numerically and graphically summarize both sample and population data, (2) inferential statistics that draws conclusions about a given population from samples taken of it, (3) probability determinations that can be used to generate estimates of reliability allowables, and finally (4) the setup of designed experiments and analysis of their data to identify significant material and process characteristics for application in both product manufacturing and performance enhancement. This paper presents examples of analysis and experimental design work that has been conducted using Statgraphics® statistical software to obtain useful information with regard to solid rocket motor propellants and internal insulation material. Data were obtained from a number of programs (Shuttle, Constellation, and Space Launch System) and sources that include solid propellant burn rate strands, tensile specimens, sub-scale test motors, full-scale operational motors, rubber insulation specimens, and sub-scale rubber insulation analog samples. Besides facilitating the experimental design process to yield meaningful results, statistical software has demonstrated its ability to quickly perform complex data analyses and yield significant findings that might otherwise have gone unnoticed. One caveat to these successes is that useful results not only derive from the inherent power of the software package, but also from the skill and understanding of the data analyst.