

SPACE SYSTEMS SYMPOSIUM (D1)
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PRODUCT DEVELOPMENT UTILIZING WORKFLOW OPTIMIZATION TECHNIQUES IN A
COLLABORATIVE INTEGRATED PRODUCT TEAM

Abstract

Student launch projects provide an invaluable model for workflow optimization within integrated product teams. At the University of Alabama in Huntsville (UAH), Mechanical and Aerospace Engineering students working with the Aethon research sounding rocket as part of Charger Rocket Works (CRW) have developed cutting edge systems engineering methods for product development emphasizing cost, schedule, performance, reliability, and safety as paramount objectives. The impetus is to provide a low-cost solution to launch vehicle concept validation while providing for innovation, quality, and scheduling demands of the aerospace industry. Students developed a high powered rocket as a test bed for preliminary subsonic and supersonic structural and aerodynamic validation of a full scale launch vehicle while adhering to key development stages during an eight month timeframe. These development stages consisted of a preliminary design review, critical design review, flight readiness review, and post launch assessment review – all designed to monitor and evaluate process milestones and achievements. To ensure that scheduling demands were met, a unique approach to the systems engineering process led to budget and development status modifications at predefined stages. Major milestones throughout the process including concept analysis, testing, and verification were implemented and integrated with predetermined procurement cycles alongside manufacturing lead times to ensure proper use of budget and scheduling resources. All stages of development coincided, providing flexibility to design changes while maintaining safety reviews and process reviews to achieve success in both quality and scheduling constraints. This method proved critical in achieving high performance and efficiency of development and manufacture during a condensed process lifecycle. The present paper describes the innovative systems engineering methods used by the UAH student launch team in the development of the Aethon research sounding rocket and the application of these methods to future projects and use across the aerospace industry.