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SOLID ROCKET PROPELLANT CHARACTERIZATION THROUGH CRAWFORD STRAND  
BURNER REGRESSION RATE TESTING**Abstract**

In order to optimize the performance of custom solid rocket motors manufactured by the Arizona State student rocketry group Daedalus Astronautics, research funded in part by the Fulton Undergraduate Research Initiative at Arizona State University has been carried out to measure the burn rates of different propellant compositions to determine empirical quantities that characterize these types of combustibles. The burn rate tests utilize a custom built Crawford Strand Burner apparatus. The body of this report details the construction and theory behind the operation of the Crawford Strand Burner, as well as provides analysis of data obtained during testing. The propellant characteristics that were calculated from the burn rate tests were validated through the use of small scale motor test data made available by Daedalus. The validation process has revealed that data obtained from the strand burner is well within the margin of error that is expected for this type of testing. This apparatus can now be extended to characterize additional propellant combinations, with an emphasis on optimizing the total propellant performance. Such a method offers added flexibility and rapidity during custom propellant trials and can provide invaluable insight to the design of all future custom solid rocket motors.