

SMART Rockets

A contribution to the DLR STERN program by Dresden University of Technology

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Abstract

In this contribution, we would like to present a collaboration project of students in different semesters of their main study period. The goal of this project is to develop, build and start a small research rocket driven by liquid propellants.

During their work, the students will familiarize themselves with the topic of a small scale rocket, including the components and subdivisions comparable to a commercial carrier rocket in a large scale. Hence, every student obtains an interdisciplinary overview about a complex technical machine covering the process from the first design to the point of quality management.

During the development of the rocket, a mobile test bench suitable for a combustion chamber with a nominal thrust of 500 N will be designed, manufactured and certified. With this test bench, the students will learn about to handle the liquid propellants LOX (liquid oxygen), LN2 (liquid nitrogen) and ethanol. Additionally, the test bench will be used for the qualification of a coaxial injector and a corresponding combustion chamber designed by the students. The development of this test bench and the design of a reusable rocket are the central issues of this project, covering the material selection and constructive details. The payload module within the rocket could serve as platform for atmospheric surveys up to 5 km height, conducted by the institute.

Besides the education of students in the field of carrier rockets, there is a vision of developing a novel altitude compensating staged nozzle engine (the corresponding patent has been granted and will be presented) for single staged rockets of all size ranges. These engines are called "SMART Rockets" at the Dresden University of Technology.

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