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HANDS-ON ROCKET SCIENCE – HOW THE STERN PROGRAM MOTIVATES UNIVERSITY STUDENTS TO DESIGN, TEST AND LAUNCH A ROCKET

Abstract

The program "STudentische Experimental-RaketeN", designated STERN, allows students from universities across Germany to design, build, test and launch these rockets. The DLR Space Administration launched the program in April 2012. German Federal Ministry of Economics and Technology (BMWi) is the responsible funding agency for the program and appointed DLR Space Administration with the management of the STERN project.

The goal of the STERN program is to increase awareness to the requirements of the space transportation sector in both technical and human resources fields. Thus, the main objectives of the program are threefold, namely:

- Inspire student interest in space transportation subjects through hands-on activities,
- Entice universities with financial support to supervise and support student projects,
- Increase course work and lecture activities in fields such as launch systems, propulsion systems or similar which address space transportation issues.

A student group participating in the STERN program submits a proposal outlining its space transportation project. According to the program announcement, the space transportation system has to suffice a specific set of requirements, namely:

- Minimum velocity of Mach 1,
- Mandatory recovery system,
- Functioning telemetry system to transmit key parameters including at least – but not limited to – trajectory, housekeeping, and altitude data.

Moreover there are no limits regarding peak altitude or the propulsion system used (solid fuel, liquid fuel, steam or hybrid).

DLR Space Administration selected eight (8) proposals from universities whose student teams were selected to participate in the STERN program. This first STERN cycle is soon coming to a close. As of February 2016 more than 460 students have been reached so far. Five student teams launched a total of eight rockets in Kiruna, Sweden, during three separate campaigns. This first announcement produced a significant number of theses for bachelor, master and PhD degrees.

The STERN program is unique and unparalleled in light of its objectives aiming at education of university students. This paper introduces the STERN program and highlights its objectives to improve

university education, student's professional development and fostering a new generation of engineers for the space transportation sector. In particular, it presents an overview of its hands-on activities aligned to industry practices and summarizes students' perspectives regarding technical achievement and lessons-learned. Furthermore, the paper discusses operational improvements which the program instructed to strengthen its robustness for the future.