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SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
On Track - Undergraduate Space Education (3)

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MATRIOCHKA SPACE PROJECT E1S3

Abstract

Matriochka is a bi-stage experimental launcher built by a student team from the ESTACA; a leading space engineering school (France). In this student team named ESTACA Space Odyssey (ESO), all of the students work as volunteers on their free time.

Space lessons at the ESTACA are given by engineers from companies like Airbus DS or Safran or from the French space agency: CNES. Main topics are first about launchers such as liquid and solid propulsion, architecture, structure and also about satellites sub-systems (telecommunication, orbital mechanics...). Then theoretical notions developed are applied during workshops. Moreover we work all year long on a study case project to train ourselves to become space engineers. These projects are led by space sector industrialists.

Working on the projects of the ESO – thus non-compulsorily – complements the ESTACA courses. One of the main characteristic is the small number of people involved in a given project: this hand-on work can therefore be more efficient. Although we sometimes require some help because there is no teachers involved in these activities. This lets us fully responsible of the training of the younger members. The

main constraint about knowledge transmission is the fast turnover: about two to five years. And add to our activity mostly dedicated to experimental launchers, it also covers every step of a typical project. That is why members are recruited among students from every track of our engineering school – not just among space track students.

The idea of learning on the job is well settled at the ESO. However, due to the ambitious concepts of Matriochka project, an industrial-like process was adopted. Considering the lack of data available on similar projects of the ESO, we exhaustively document every step of our project (design, production, operations). This formal work as system engineers and a constantly updated schedule enhances efficiency and avoids wasting time. The members are divided in small teams: first reusable stage, upper stage and electric sub-system (instrumentations and power supply). On each topic there is an experimented member. This student-to-student teaching eases the learning but also helps to reduce the mistakes.

To sum up, Matriochka, our two-stage experimental rocket perfectly complements the program of the ESTACA. For example, the jettisoning system dependability analysis was part of the 3rd year program. Both industrial management and practical learning have deepened the knowledge and helped to get used to professional methods.