

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
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TRAINING UNDERGRADUATE ENGINEERING STUDENTS FOR SPACE INDUSTRY START-UPS  
THROUGH STUDENT-RUN DESIGN TEAMS

**Abstract**

As the space sector expands, a growing number of space related start-ups are looking for talent that can fill the unique demands of a rapidly evolving workspace. CU InSpace, Carleton University's rocket engineering design team works to prepare students for this type of environment. This paper pertains to activities of the team to develop the workplace skill sets of undergraduate students. CU InSpace is a non-profit student run team made up of approximately 75 active undergraduate members who work together to design, test, and build experimental sounding rockets that are launched at competitions such as the Spaceport America Cup. The structure of the team closely resembles the layout and schedule of a typical start-up organization. As such, to advance student preparedness for the space workforce, the team builds a new rocket over the course of a school year and incrementally designs vehicle performance improvements year-to-year.

Three primary skill sets are developed while working with the team; manufacturing, design, and teamwork. CU InSpace members design and manufacture the majority of the rocket's airframe. In doing so, students gain experience in composite manufacturing techniques, metal fabrication, manufacturing specifications, and integrated circuit computer board design. Students are also exposed to a variety of industry-level design tools including SolidWorks CAD, SolidWorks FMEA, Eagle PCB design, ANSYS CFD and OpenRocket. Obtaining a wide variety of skills is critical in small, fast-moving company environments where one employee could be responsible for several different aspects of a design. Students also gain leadership and organizational skills, learning to take ownership of parts that the team has designed while working to incorporate designs with the needs of other components. This involves close coordination between students with diverse educational backgrounds, strengthening ties between various disciplines in engineering.

In a laboratory environment, student designed components are physically tested to verify the methodologies and theories learned in the classroom. Skills learned while working as part of an undergraduate student engineering team are invaluable to engineers entering the space workforce, especially because the experience gained fuels student development and prepares them for an ever evolving space economy.

Challenges presented in constructing these rockets provide future engineers with the required skills and exposure to thrive in small start-up like environments. CU InSpace has the capacity to foster student growth and learning in a protected, inclusive and supportive environment to enable students to reach their goals of working in the space industry.