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ALABAMA ROCKETRY ASSOCIATION: THE EFFECTIVENESS OF STUDENT DESIGN TEAMS IN THE DEVELOPMENT OF THE NEXT GENERATION OF ROCKET ENGINEERS

Abstract

The University of Alabama's competitive rocketry team, Alabama Rocketry Association, is a prime example of the development of the future space workforce. Established in 2015, ARA has sent members on to work at top aerospace companies, including NASA, Blue Origin, SpaceX, Aerojet Rocketdyne, and ULA. Through ARA's few years of existence, the organization has determined the most effective ways to provide essential hands-on knowledge and to prepare students for fast-paced industry careers.

ARA is a unique design team because it sponsors four separate programs. Those four programs are known as Ares, Deimos, Phobos, and the Tuscaloosa Rocketry Challenge. The first three are technical design teams. Ares is a liquid launch vehicle design team, currently pursuing the university's first liquid methane - liquid oxygen launch vehicle. Deimos is a solid launch vehicle team, providing a foundation for new members by constructing and launching a composite off the shelf (COTS) launch vehicle each year. Finally, Phobos is the research and development umbrella for all other projects within ARA. All technological developments, such as advanced composites, electronic controls, and custom motors, are tested and validated through Phobos before they are implemented in Ares or Deimos.

The Tuscaloosa Rocketry Challenge (TRC) is also a part of what makes ARA different than most student design teams. TRC is a county-wide program that sends college students to local middle schools to build water rockets and teach students about STEM and space. Currently in its fifth year, TRC has expanded greatly and hosts a large final competition on campus, hosting three teams of eight students from each participating school.

Through each of these facets, ARA works to inspire a passion for STEM and space in and outside of the University of Alabama. The complexity of projects within ARA and the many challenges students encounter are integral to their development as engineers. Each project taken on is uniquely challenging, from multistage rockets to liquid engines. The students learn how to work well as a team, team leaders learn how to successfully manage people, and team participants learn how to design and analyze components. Ultimately, ARA has served as a successful vehicle for the development of young engineers and the future of the space industry. A hands-on, creative engineering project is by far the most successful method of student development, providing opportunities to learn about all aspects of the rocket industry as well as systems and test engineering.