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SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Enabling the Future - Developing the Space Workforce (5)

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THE 20-MINUTE WIND TUNNEL: DESIGNING EASILY REPLICABLE STEM TOOLS IN ORDER TO GROW THE AEROSPACE WORKFORCE

Abstract

In order to foster international design collaboration and promote aerospace careers, a partnership between the University of Alabama in Huntsville (UAH) in the United States (US), and the Cape Peninsula University of Technology (CPUT) in South Africa, was formed in 2012. The partnership enables engineering Capstone Design Class (CDC) students at UAH and CPUT, the opportunity to collaboratively design Science, Technology, Engineering, and Mathematics (STEM) tools that are subsequently donated to Kindergarten through 12th grade (K-12) classrooms in order to provide hands-on learning experiences and motivate the young students to pursue aerospace careers. STEM tools accelerate K-12 students' understanding of curriculum content that is typically presented in a purely theoretical manner, by integrating tactile learning. The STEM tools are ultimately intended to increase interest in STEM education and careers-a major focus and priority in the US and South Africa. Since the formation of the UAH/CPUT partnership, four different STEM tools have been designed, fabricated, tested, refined, and delivered to various K-12 schools in both nations. The first three STEM tools include a catapult and two different tabletop wind tunnels. A major lesson learned, as a result of the development of the first three products, was that potential replication of the products would require tooling and manufacturing equipment that are not easily accessible by communities worldwide. As a result, it was agreed that subsequent STEM tools, the focus of the present paper, would require only basic hand tools and materials to fabricate and reproduce, such that virtually any educational community can build the STEM tool. Since the two wind tunnels already delivered were extremely popular among K-12 students, and increased aerospace knowledge and curiosity, it was determined that future STEM tools would also be wind tunnels. A top-level requirement was that the wind tunnels would need to be assembled in 20 minutes or less. The present paper details the design and development of the 20-minute wind tunnel development effort, the educational impact of the international design experience upon the UAH and CPUT students, and data conveying the aerospace educational impact upon the K-12 students in the US and South Africa.