

Development of Hot-Fire Engine Test Stand at Land-Grant University Amid Restrictive Pandemic Protocols

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The development of the hot-fire engine test stand for the University of Arizona is intended to further enhance the capability to test and analyze solid and liquid propellant rocket engines. The design process can be categorized into three major areas of focus: safety, structural integrity and data acquisition. These categories are often intertwined, creating a complex design process. Namely, the structural integrity of the stand is inextricably linked to its safe operation, and the data acquisition system must not hinder the structural integrity of the stand nor be compromised in any way as a result of its operation. Due to the pandemic, new lab protocols have been implemented to foster a safer work environment, including a mask mandate for all students and staff in the lab, as well as fewer students in the lab at any given time to promote social distancing. With the size of the combustion laboratory, this limit translates to one person in the lab at a time, and with two students in need of the lab space, a decreased time for each student to complete tasks requiring lab space and resources. Furthermore, the difficulty of rapid and detailed communication has increased, particularly regarding explanation or correction of schematics and/or design flaws. Upon completion, the hot-fire engine test stand will be equipped to provide future classes the ability to witness several of the engineering principles they have learned and the opportunity to strengthen engineering skills vital in industry or higher education, such as data analysis and technical writing.