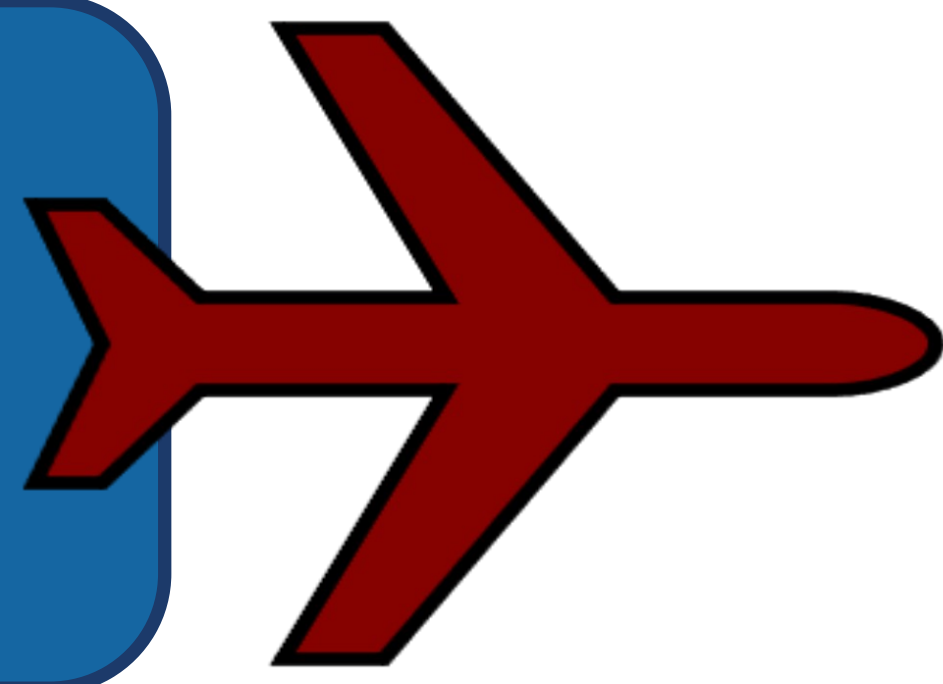


# Test Fuel and Blowout Stand



**Team 21 Members:** Triston Gilchrist, Sam Wieneke, Mike Thorson, Grant Stroup, Chris Begeman, Edgar Velazquez

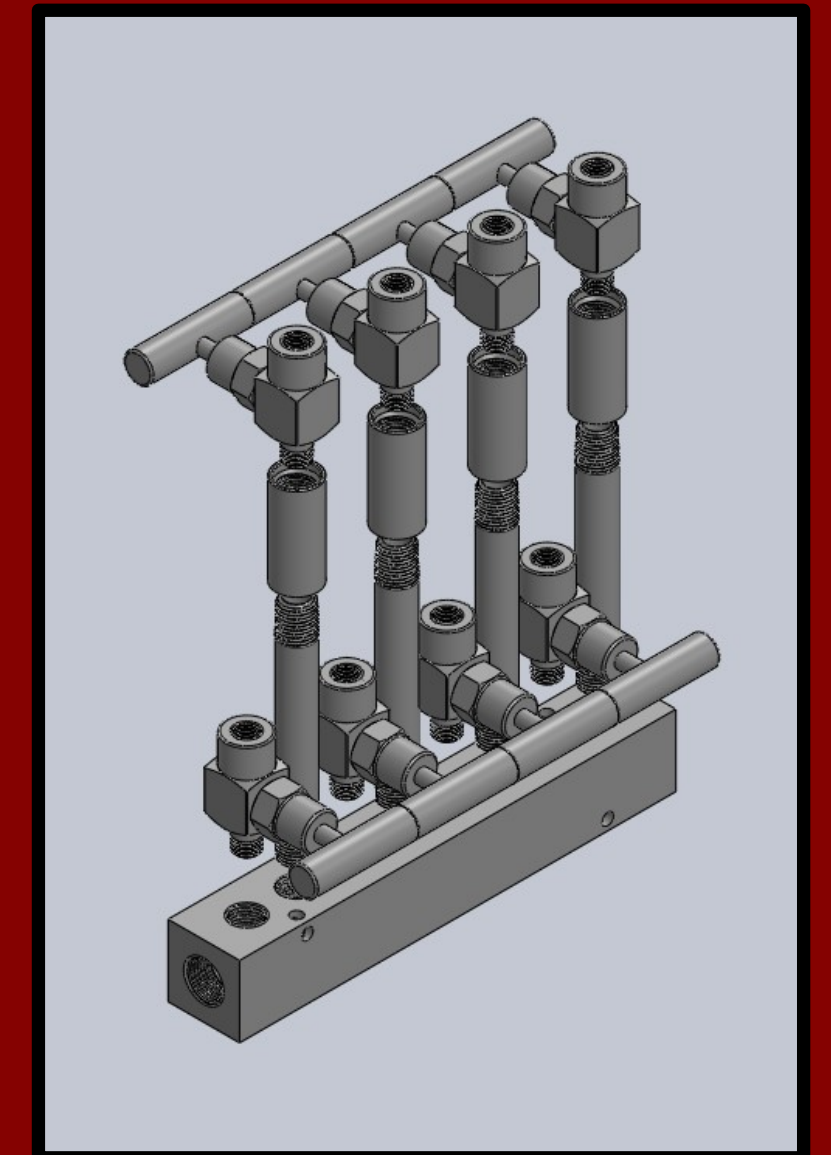
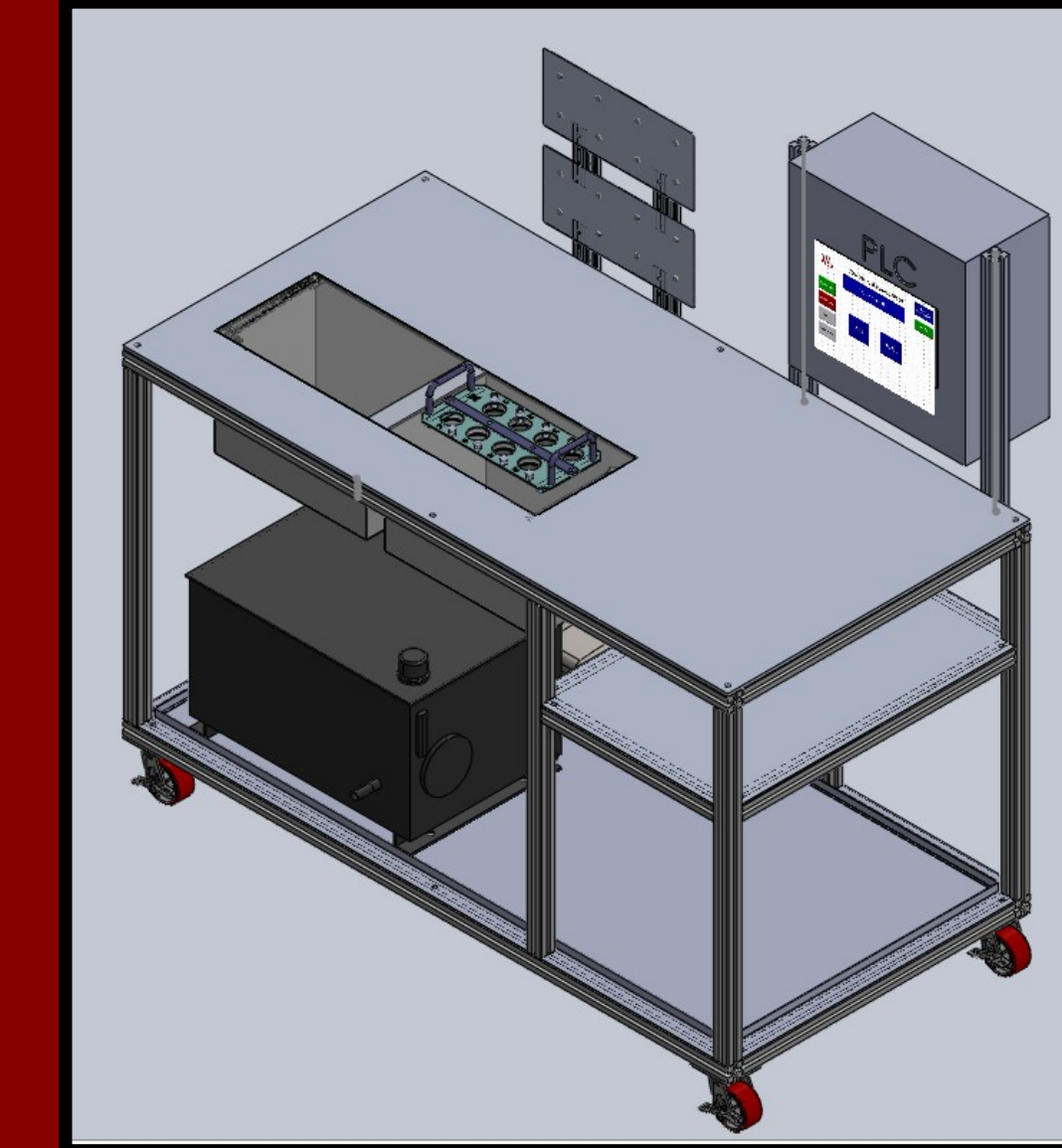
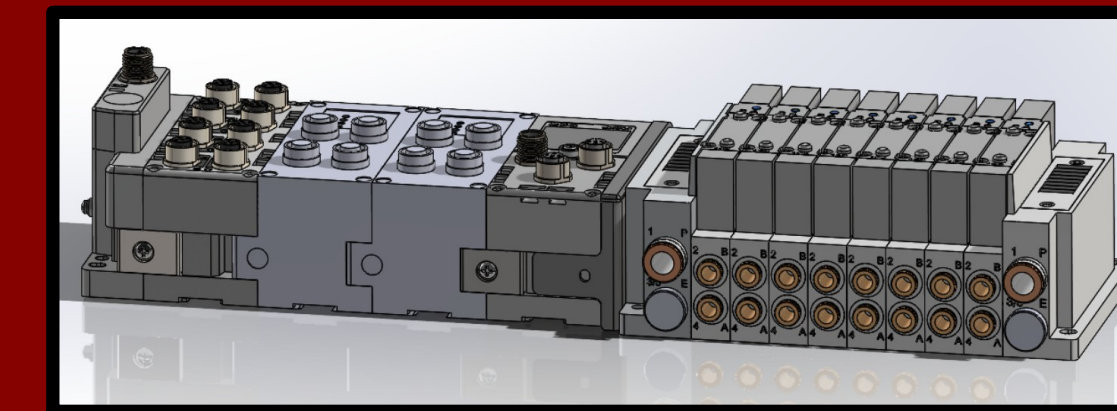
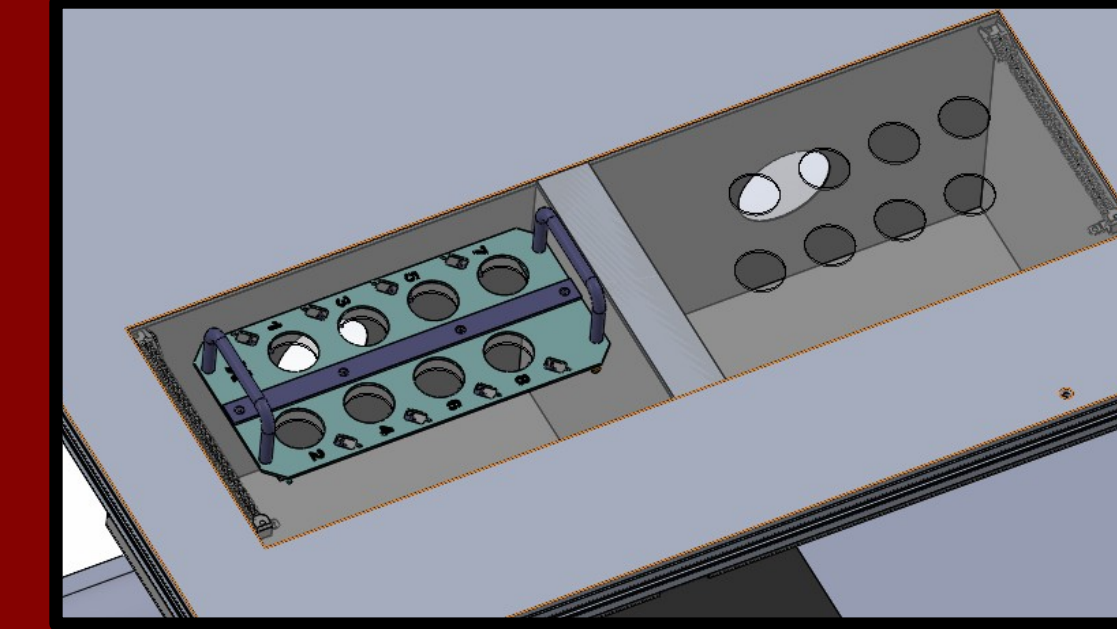
**Academic Advisors:** Dr. Abishek Balsamy-Kamaraj, Dr. Farid Jafari, Dr. Wendy Reffeor, Dr. Philip Hittepole

**Sponsor Support:** Paul Brown, Rex Beach, Adam Klingensmith, Paul Armes

## Project / Sponsor Overview

Woodward is a company that designs and manufactures fuel systems for various aircraft among many other products. The plant based in Zeeland, MI has a program that restores jet fuel nozzles after so many flight hours. One of the processes of restoration is the cleaning of the interior of the nozzles, which requires running a calibration fluid and compressed air through the nozzle. Currently, there are three separate machines (below) that handle this task, and the project proposed by Woodward involved combining these three machines into one. With less operator movement and adapter changes per nozzle, significant time savings come along with this project.

## Design Work



## Final Build



The stand operates connecting hoses to the Woodward fuel nozzles, and blowing test fuel or compressed air through the parts, which is controlled by a PLC and HMI input. The test fuel is caught by the tub beneath it and is then recycled in the system.

## Build and Benefits

The design work took place from January to April 2024, and the build took place from May to July 2024. The table was constructed while the PLC and HMI were assembled simultaneously. A common adapter is able to be used for both test fuel and air, reducing adapter changeout time. With the combined functionality of the previous three machines, a cycle run time for the processes is estimated to be 50% faster with the new machine. Floor space is saved by reducing the footprint of the three machines into the new compact space, and the maintenance for cleaning is more accessible than before. A special thanks goes out to Paul Armes and Adam Klingensmith for their continuous support throughout the project.



Old Machines