Lycoming - Engine Injector Test Bench

Overview
Lycoming Engines tasked the team with designing and fabricating an injector test bench for a small aircraft engine. The test bench needed to be safe, reliable, and easy to use. It was essential that Lycoming could safely test multiple injectors as quickly and efficiently as possible.

Objectives
The team’s objective for this project was to design a test bench that was completely safe to use and satisfied all of Lycoming’s testing needs. The product needed to run the fuel rail, provide sufficient view to collect necessary data, and safely dispose of the fuel after testing.

Approach
- Lycoming engineer, Tyler Bello, provided a detail project description
- Used details provided by Lycoming to create a list of customer needs
- Generated several concepts for the main features of the product
- Used concept selection methods, such as AHP matrix, to choose our final design
- Made detailed CAD models of each feature and the final design
- Obtained necessary materials from vendors such as McMaster-Carr
- Constructed the alpha prototype in the Learning Factory
- Tested the alpha prototype at the Lycoming facility
- Rated several testing criteria on a Pass/Fail basis
- Used this testing information to improve the design and build a beta prototype
- Created a fuel surrogate (1% M propylene glycol) to circumvent safety hazards
- Tested beta prototype at the Lycoming facility with surrogate
- Used testing data to make recommendations on how beta could be further improved

Outcomes
- Lycoming will now be able to emulate actual operating conditions and test air injectors with both fuel and air
- Injector inconsistencies can now be detected before actual engine testing of the injector
- The product satisfied all of the customer needs supplied by Lycoming and fulfilled the deliverable agreement