## Requirements

- The APOP team will modify a JetCat P100-RX to increase the thrust-to-weight (T/W) ratio by at least 60%

- The T/W ratio increase will not decrease the stock thrust specific fuel consumption (TSFC) by any more than 20%.

- The final results will be estimated with a cycle analysis model that is accurate within 20% of actual values.

## Design Solution

- Multi-stage axial compressor

- Optimized converging exhaust nozzle

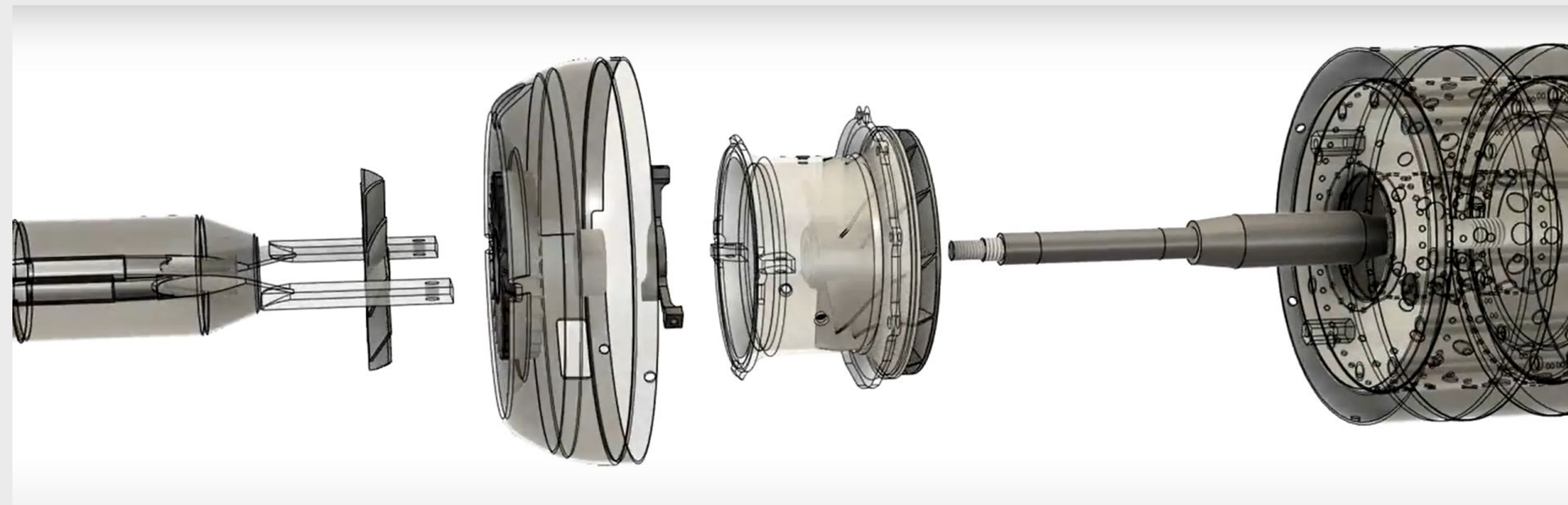- Fuel heat exchanger

- Materials change and mass reduction
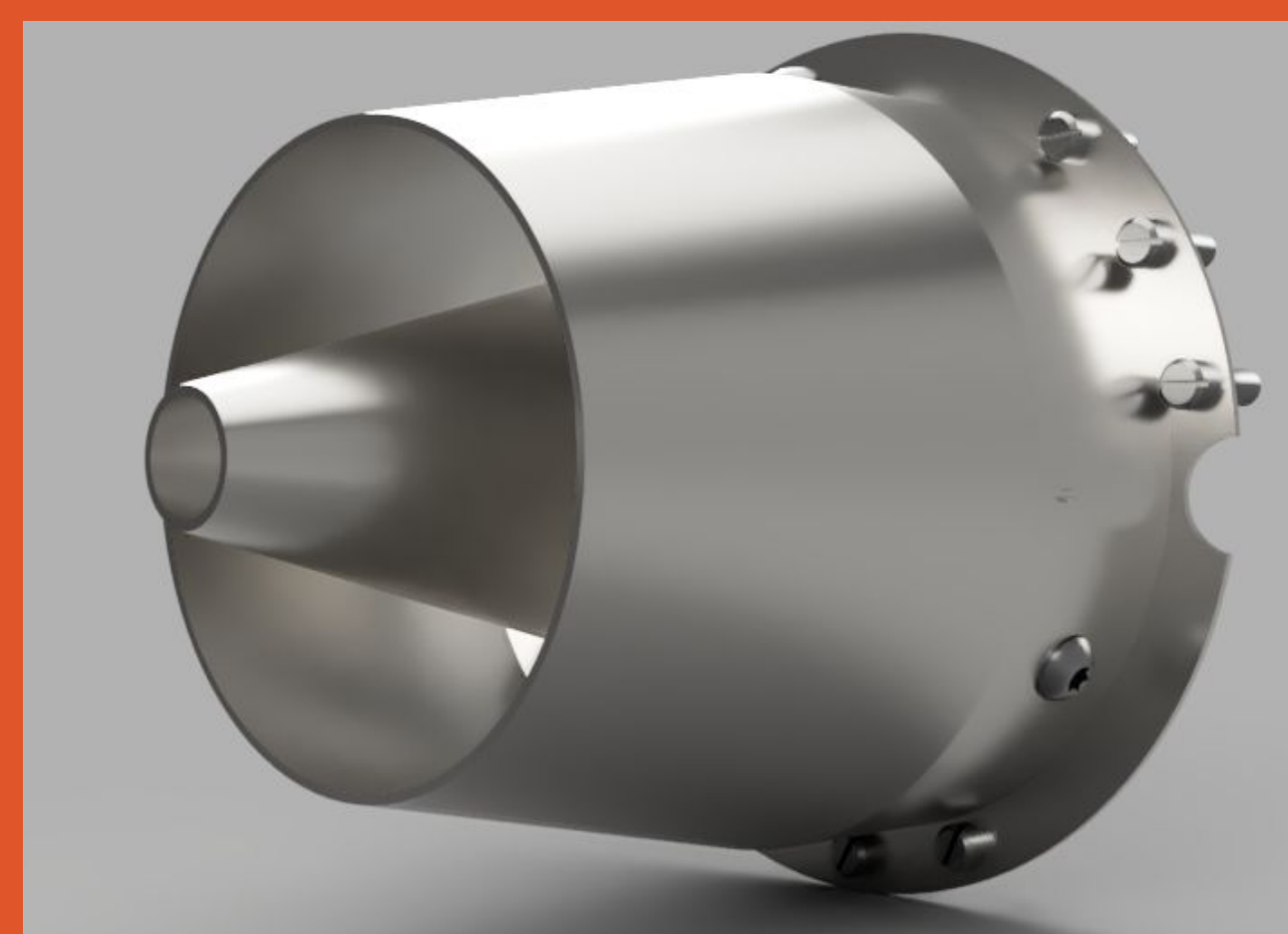


*CAD model of redesigned nozzle design*



*Photo of compressor components*



# APOP

## Aerospace Propulsion Outreach Program:
## A Gas Turbine Engine Challenge



## An Annual Challenge

The Air Force Research Laboratory (AFRL) issues a challenge to participating universities each year to modify a small (22.5 lbf thrust class) engine. Past challenges have included designing an afterburner and developing a Thrust Vectoring Control (TVC) system.

This year's challenge is to increase the thrust-to-weight ratio by at least 60% while not decreasing the thrust specific fuel consumption by more than 20%.
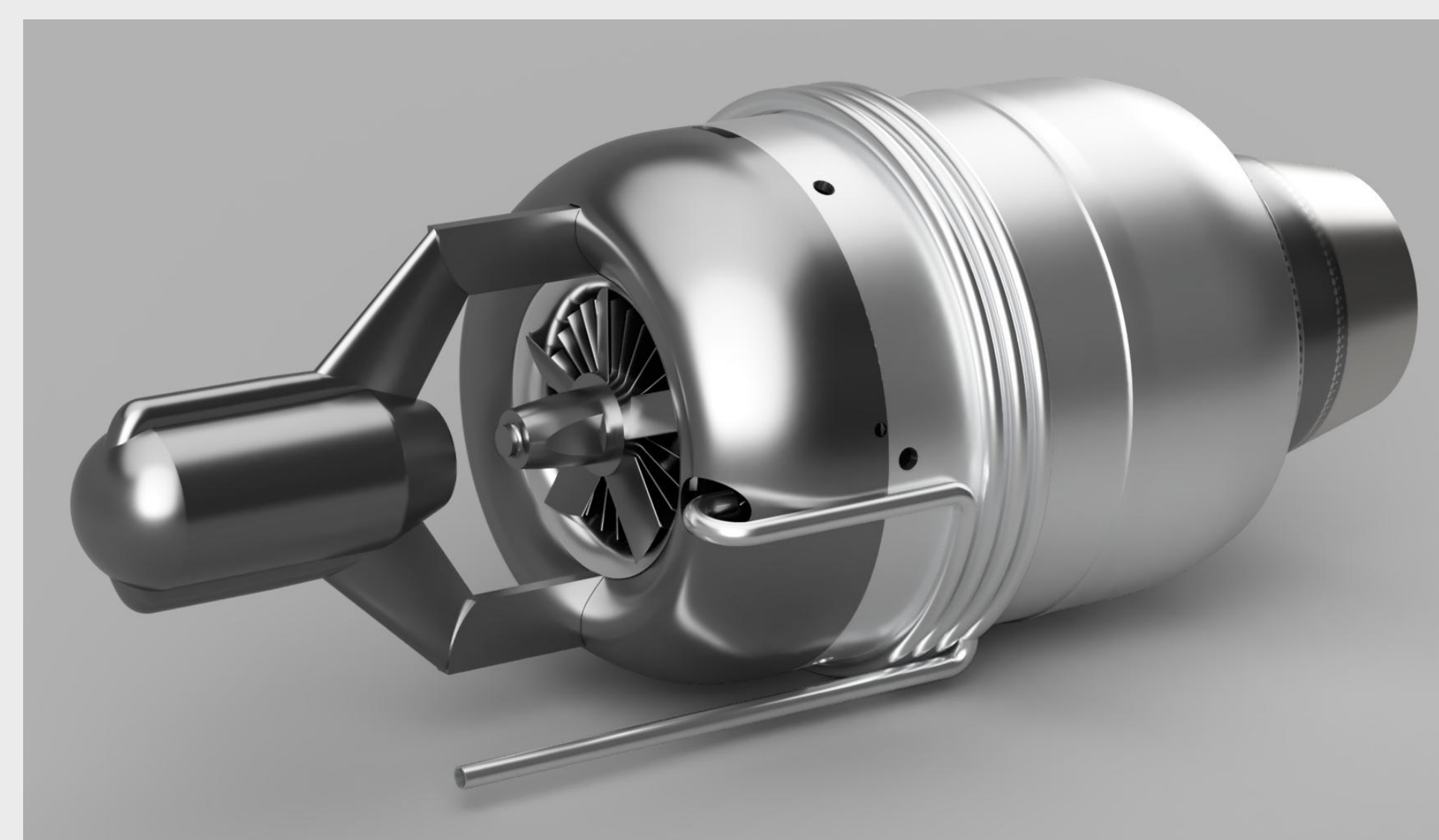


*CAD model of assembly mounted to engine*

## Testing

The thrust of the engine was measured using an S-type load cell taking continuous measurements throughout test runs.

Stock load measurements were compared to those of the multi-stage axial compressor, converging nozzle, and heat exchanger data to determine thrust increases.
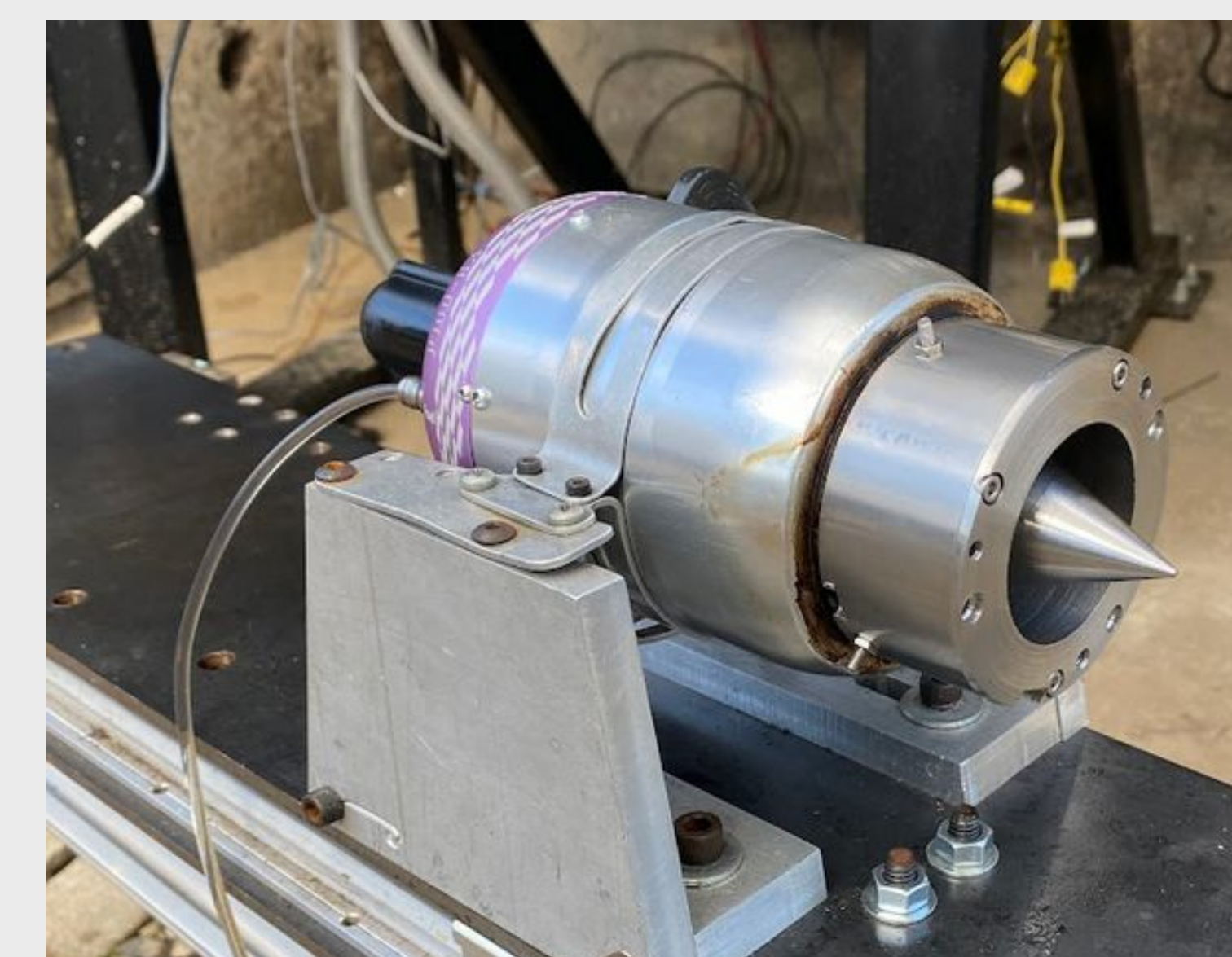


*Photo of prototype nozzle assembly mounted to engine*



**TEAM MEMBERS**

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**PROJECT SPONSOR**
Air Force Research Laboratory

## Project status

The prototype nozzle and heat exchanger have been manufactured and tested. The final design for the nozzle has been ordered from a local machine shop in Corvallis. Once this nozzle arrives, it will be tested. At this final stage, the multi-stage compressor will be tested in tandem with the nozzle. These final tests will produce the most optimal T/W values.