Launch Vehicle Design for the FAR-Mars Competition

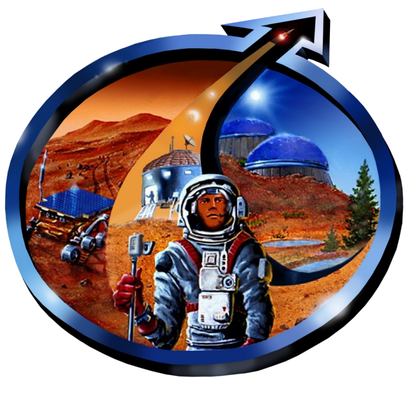
FAR-Mars Competition

. Hosted by the Friends of Amateur Rocketry (FAR) and the Mars Society.

. Undergraduate teams must design, build and launch a liquid bi-propellant rocket.

. Target altitude of 45,000 feet above ground level.

Competition Overview	
Qualification Altitude	30k-50k ft
Max Total Impulse	9,208 lbf-sec
Payload Mass	2.2 lbm
Prize	$50,000
Vertical Test Date	February 1, 2020
Launch Window	April-May 2020



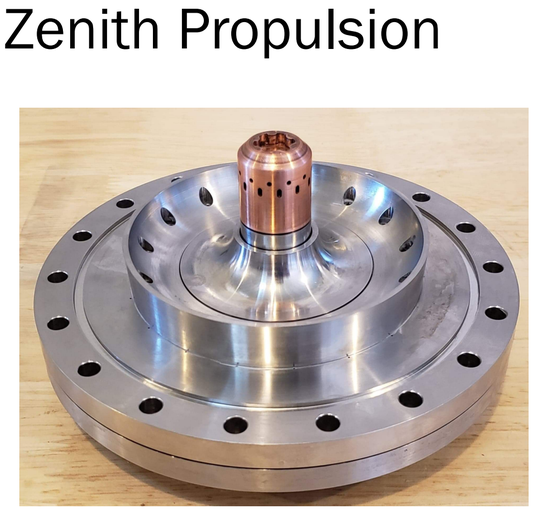
Janus Overview	
Nominal Thrust	1000 lbf
Fuel	Jet-A (kerosene)
Oxidizer	Liquid Oxygen
Injector	Ox-Centered Pintle
Cooling Methods	Ablative & Fuel Film
Manufacturing	100% In-House

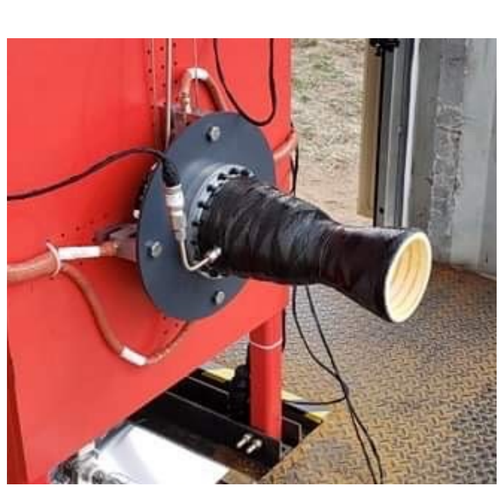
Janus Rocket Engine

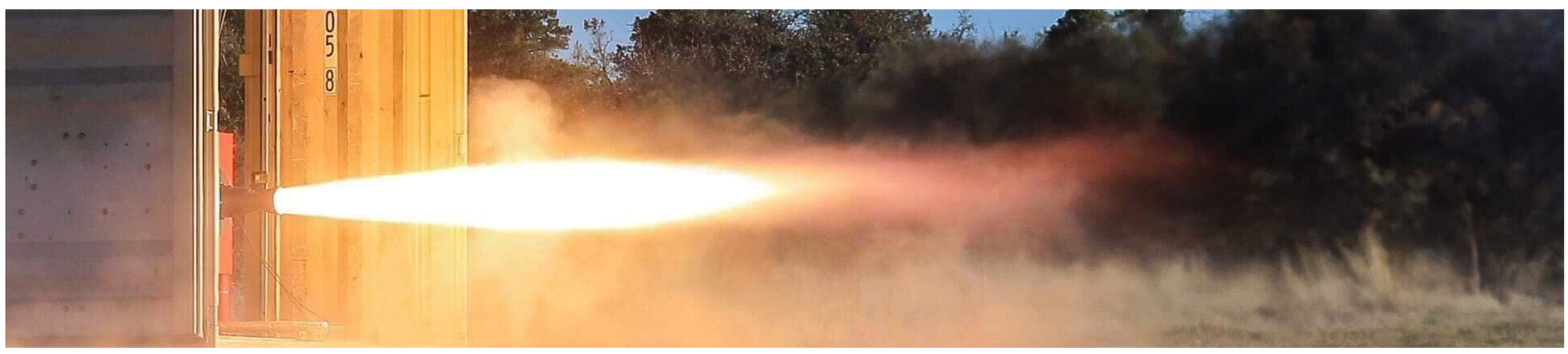
. Designed and tested by capstone team Tiber Designs in 2018-2019.

. Built along with Test Cell 3, a liquid rocket engine testing facility.

. Janus will propel the vehicle designed by Zenith Propulsion







Altair Launch Vehicle

. Designed by the Zenith Propulsion team.

. Aluminum internal skeleton provides support for tanks, feed system, payload and recovery system.

. Composite aeroshell provides bending strength, protects internal components from in-flight environment and resists aerodynamic loading.

Altair Overview	
Loaded Mass	169 lbm
Propellant Mass	45.7 lbm
Length	21 ft
Boost Duration	10 seconds
Simulated Apogee	30,090 feet
Max Velocity	Mach 1.7

Bryce Smoldon, Jonathon Noble, Maxwell Kauker, Matt Boban, Nicholas Wright, Stefan Johnson, Xander Pickard, Andrew Lucka

Mentor: Dr. Daniel Dannelley