

Brophy Rocketry

President & Founder: Bremer Kaprosy 25'

Brojave Sphinx 1 Development

One of, if not the first, high power liquid rocket engine funded, built and fired by a High School

Introduction

The Brojave Sphinx is a high power liquid rocket engine, based on the [Mojave Sphinx](#) engine design language from Half Cat Rocketry. A liquid rocket engine is much more complex than traditional model rocket engines, being more similar to rockets used in actual space flight, and the high power aspect of it requires a certification in order to operate. Built on a history of excellence in rocketry, Brophy Rocketry set out to become what we believe to be the first group of high schoolers to build and fire a high power liquid rocket engine. The engine was designed to produce over 250 lbf of thrust, putting it as a nearly full L-Class High Power engine. The engine runs off of Isopropyl alcohol and Nitrous oxide, and was funded on a ~\$1500 budget. Nearly all parts were machined and fabricated by students, including ground support systems and test stands. The engine was successfully static fired in January 2025, with plans to launch a fully integrated rocket at the Friends of Amateur Rocketry Launch Site on April 6th, 2025. Check our progress in our progress tracker [linked here](#) and see more photos and Brophy Rocketry projects at bremiere.com/brc

Development Chronology

September 2024 - Brophy Rocketry attends the national Tripoli Experimental Rocket launch in Black Rock Nevada, the team meets the creators of the Mojave Sphinx and sees it in action. Encouraged by others at this launch, Bremer Kaprosy returns to Brophy and lobbies the school for funding for this project.



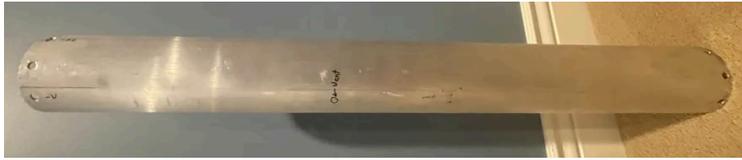
October 3, 2024 - Funding secured, Main Engine Valves are assembled, Bremer starts to machine parts on his lathe, Bulkhead rings completed and all McMaster Carr Components arrive.



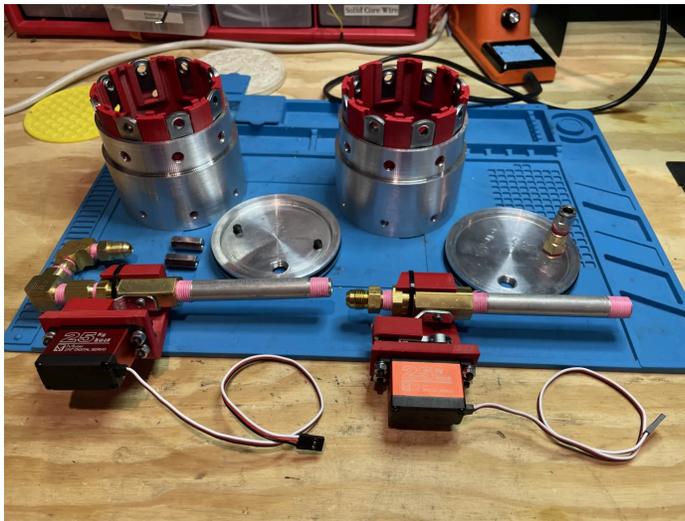
October 5, 2024 - Bremer Completes Oxidizer and Fuel Bulkhead - [Video of Machining Here](#)



October 6, 2024 - Main Tank is prepped and drilled



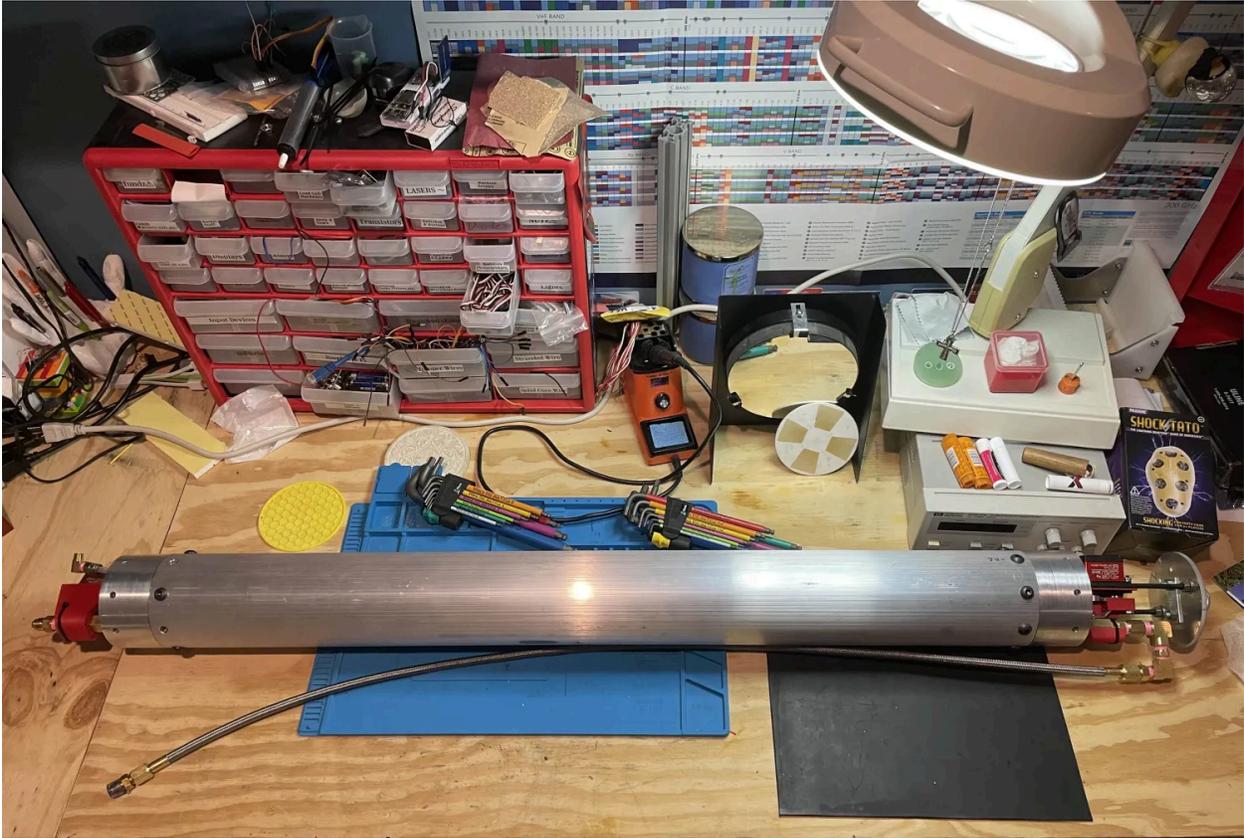
October 8, 2024 - Interface Rings, Bulkheads, and Valves all Integrated by Bremer. Injector and Nozzle assembly ordered.



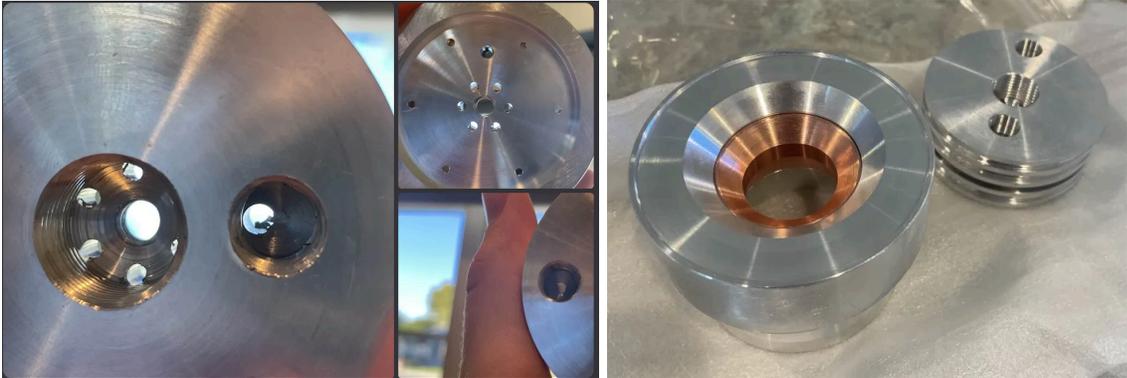
October 16, 2024 - Propellant Piston machined by Bremer on his lathe.



October 19, 2024 - Tank is fully assembled and integrated, valves tested.

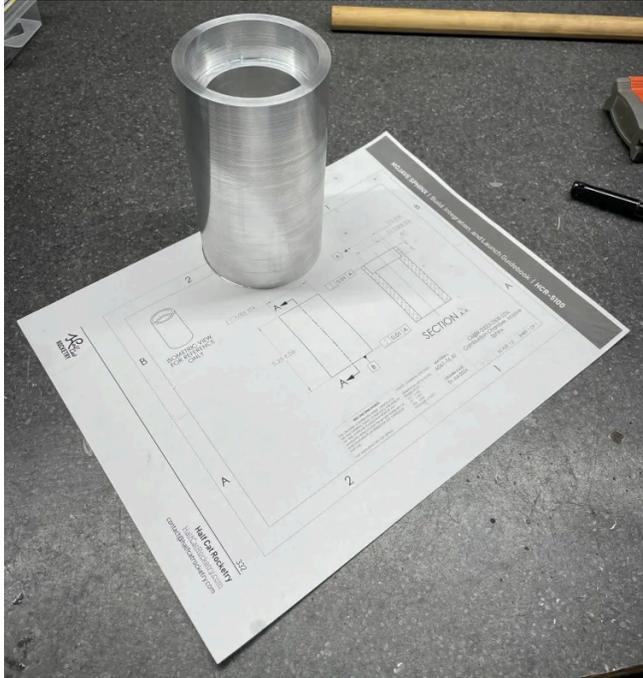


October 22, 2024 - Outsourced parts receive some post processing.



October 23, 2024 - December 7th Booked at the Friends of Amateur Rocketry Launch Site as the date of our first Static fire.

October 24, 2024 - Thrust chamber is machined by Bremer



October 26, 2024 - Bremer cuts and gathers all the parts to assemble the Thrust Chamber. Flat components were waterjetted by Bremer as well.



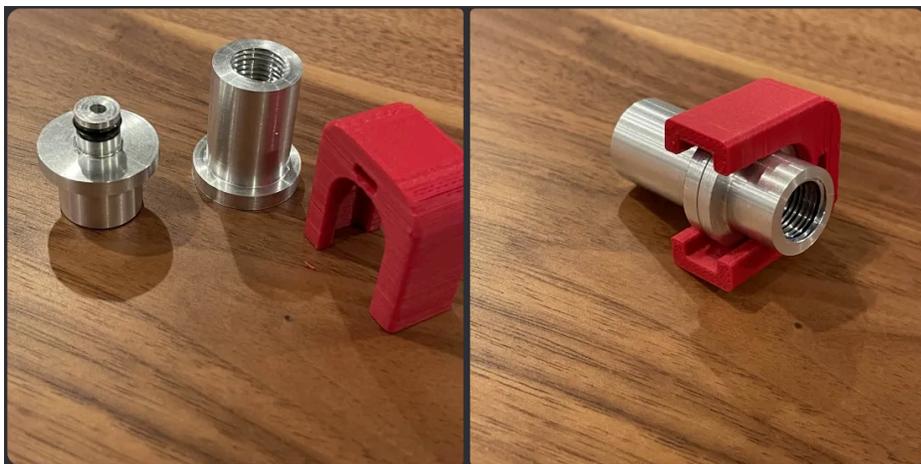
Thrust Chamber pictures continued



November 2, 2024 - Bremer fully integrated the Engine, and submitted a Mojave Sphinx serial number receiving SN-06. **Completed Motor!**



November 8, 2024 - All Parts are machined and 3D Printed. Quick Disconnect Pictured and machined by Bremer



November 4, 2024 - The completed motor is displayed for the first time at Brophy's open house.



November 26, 2024 - Rocket is assembled for the first time to display for Brophy's Fine Art Extravaganza. Stands nearly 10 feet tall.



December 3, 2024 - Bremer cuts all the parts and starts assembling the test stand. We also begin testing different colored fuels for cool flame colors.



December 7, 2024 - Arriving at the Friends of Amateur Rocketry Launch site in California, we set up our test stand. Pictured from left to right, Jonathan Cowles, Bremer Kaprosoy, Josiah Andrews, Marco Fissore.



Results

We attempt to fire twice throughout the day, neither of them successful in igniting. Our first static fire attempt experienced an issue with the fuel valve not opening, thus venting a full load of nitrous and no fuel. The second attempt suffered an igniter failure, and what we believe to be only a partial fill of the nitrous system. Having exhausted our oxidizer, we return home but are determined to get this thing to fire. No Damage occurred to the motor, and it proved that our pressure vessel held.

[Video of Unsuccessful Static Fire 1](#) - [Video of Unsuccessful Static Fire 2](#)



December 17, 2024 - A Farmer in Arizona allows us to use his land to conduct a static fire on. This allows us to not travel all the way back out to California to test our motor. The next static fire is then scheduled for February 2nd in Arizona City, Arizona.

January 25, 2025 - A new test stand is designed and fabricated, as we do not have the infrastructure afforded to us at the Friends of Amateur Rocketry site. Work is also completed by Bremer to make the test stand more robust, including machining new parts and load cell hardware. Some light refurbishment also occurs on the motor to get it fire-ready.



February 2, 2025 - We arrive at the farm in Arizona city and we set up our test stand, getting ready for our first firing of the day.



Time to get Fired up!

Results

Our first fire also resulted in no ignition, linked back to not turning off the safety on the Ignitier. But our second firing was a resounding success. **We became one of, if not the first high schools to build and fire their own liquid rocket engine.** Due to problems with our data recording, we were not able to get the exact force produced, though video evidence and deflection of the blast shield showed it had substantial, powerful force. It sounded incredible and met all requirements, with no damage sustained to the engine, ready to go again!

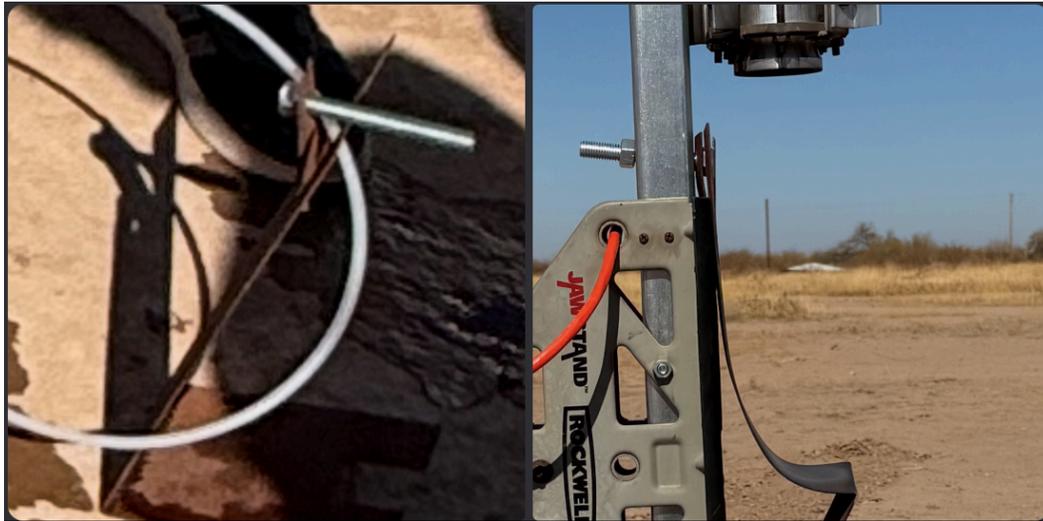
[Drone Video of the Firing](#)



[Video of Static Firing with Sound](#) - **Sounds Great, highly recommend hearing how powerful it is!**



Blast Deflector Before & After



From linear to a more quadratic blast shield!

Time to Launch this Thing!

February 6, 2025 - Brophy officially registers to launch this engine in a rocket on April 6th, 2025 at the Friends of Amateur Rocketry Launch site! Rocket integration begins, engine taken apart and cleaned. As of writing, launch developments are still active as we push to become the first high school to not only have a liquid rocket engine program, but also successfully launch a high power liquid rocket engine.

April 6, 2025 - Launch Day - It Flew!

More Information to be added, but see videos and pictures at these links! Became the first high school to ever launch a high power liquid rocket engine!

Photos: <https://www.linkedin.com/feed/update/urn:li:activity:7316954872099061760/>

Videos

Drone Shot: <https://www.youtube.com/shorts/k3EIXL6H32o>

Ground Shot (With Sound!): https://www.youtube.com/shorts/1XE5m9qzu_8

Brophy Rocketry - AMDG

Written by Bremer Kaprosy

