NAKUJA PROJECT INTERNSHIP

WEEK 8 PROGRESS REPORT

Propulsion

TASKS ACHIEVED THIS WEEK

- [#19] Iterative Static Firing Tests #5;#6
- [#53] Bulkhead fabrication
- [#52] Nozzle fabrication
- [#71] Casing fabrication

[#19] Iterative Static Firing Tests

We had a firing test on Wednesday evening.

We achieved a maximum pressure of 60N

The nozzle was slightly corroded around the throat.

Static test #6

Next static test was on Thursday..

The propellant grain was prepared

using oxidizer-fuel ratio of 68:32.

We obtained a maximum thrust of 160N

Nozzle failure resulted. It was noticed that

the throat had corroded from the previous

static test.The same nozzle had also been used

in the previous static tests. All this combined with

the higher oxidizer ratio possibly contributed to the nozzle failure.

- **[#53] Bulkhead fabrication**

We fabricated more bulkheads to be used on the main casing and also in the casting process.

• [#52] Nozzle fabrication

two nozzles a full nozzle...

made from aluminum...

and another optimum nozzle from

mild steel..a full nozzle contributes

to lower pressures compared to an

optimum nozzle. Mild steel has higher

strength allowances compared to aluminum

at the expense of increased density...

Design Considerations

Steel is strong and less likely to warp, deform or bend underweight, force or heat. Nevertheless, the strength of steel's tradeoff is that steel is much heavier/much denser than aluminum.

Steel is typically 2.5 times denser than aluminum.

The link below documents the nozzle and casing design consideration

https://github.com/nakujaproject/N2-Propulsion/blob/main/Fuel/Nozzle%20Designs/NOZZLE%20DESIGN%20CONSIDERATIONS.pdf

Casting:Two grains were prepared.

The oxidizer-fuel ratio used was 67:33.

4g Red -Oxide was added per casting.

We plan on using both grains in a single firing test.

TASKS TO BE DONE

- [#32] Test stand PCB Etching
- [#99] Camera mount for test stand
- [#11] Casting Tools Fabrication [Curing under pressure]
- [#108] Implement servo controlled wireless ignition
- [#98] Temperature & Pressure measurement during static testing

Timeline

Month	Intern week	Tasks
Jan		
	Week 1	Designs [Fuel, Casing, Nozzle, Bulkhead, Casting tools, Test stand]
	Week 2	Fabrication of items
	Week 3	Fuel Fabrication and test stand revamp
Feb	Week 4	Fabrication of items & Fuel casting
	Week 5	Iterative Fuel tests
	Week 6	Launch Pad design and iterative fuel tests
	Week 7	Iterative fuel testing and improvement