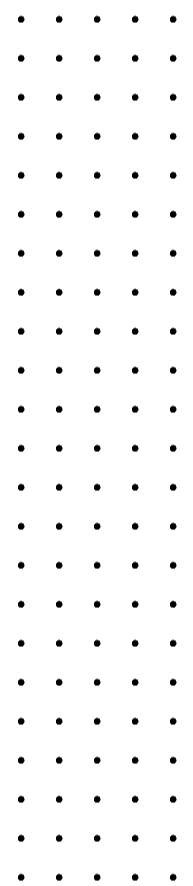


66% BUILD
UPDATE

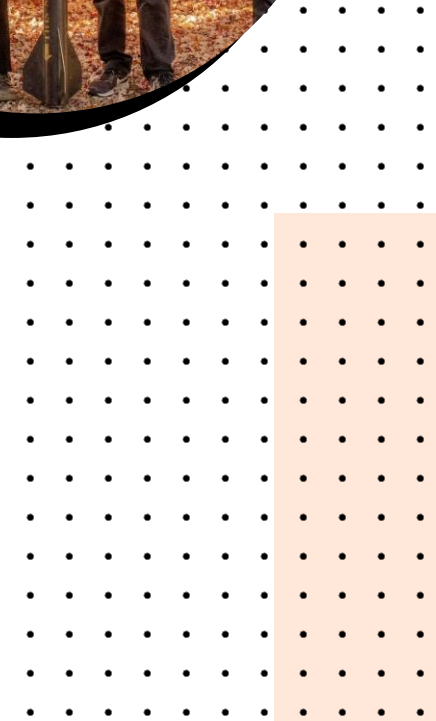
NAU ROCKET
PROPULSION
TEAM #3

**REMY DASHER, SHANNON COMSTOCK,
GRACE MORRIS AND ANDREW KING**

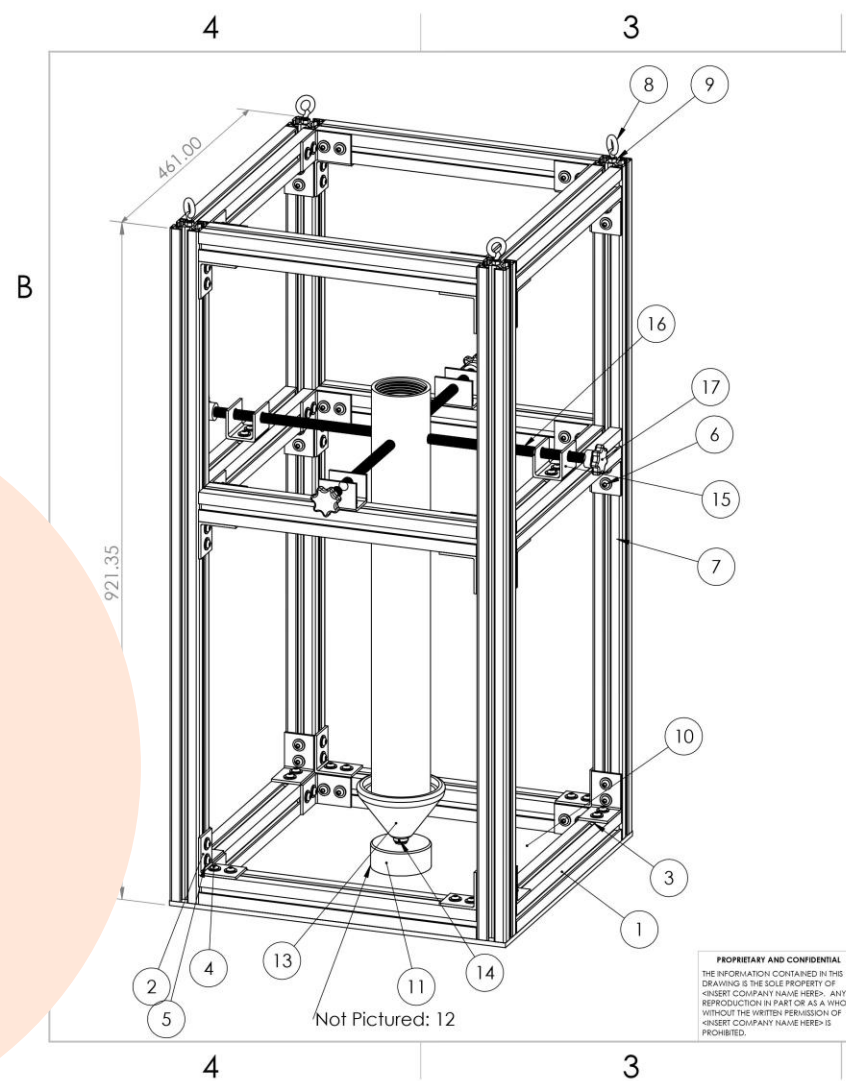


SUMMARY OF PROJECT

- Build a propulsion system for a high-power, level 2 rocket
 - Design the motor to fit the 3-meter-tall carbon fiber rocket body built by the NAU Rocket Club
 - Develop a unique Ammonium Perchlorate Composite Propellant (APCP) formula
 - Cannot exceed an M-Class motor ($>2180 \text{ N}\cdot\text{s}$ Impulse)
- Design and build a rocket test stand to gather data on rocket motors efficiency
 - Work with EE team to input thrust and impulse data
- Have at least two motor testing's small scale 38 and 54 mm
- Design and build a motor casing for final 75 mm
- Build a final 75mm diameter rocket motor to launch in Phoenix March 23rd or 24th, 2024



TEST STAND

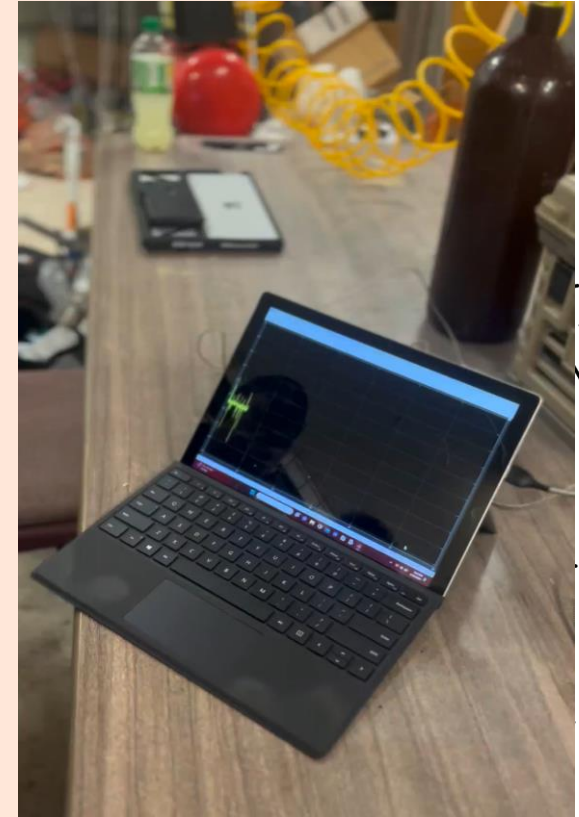
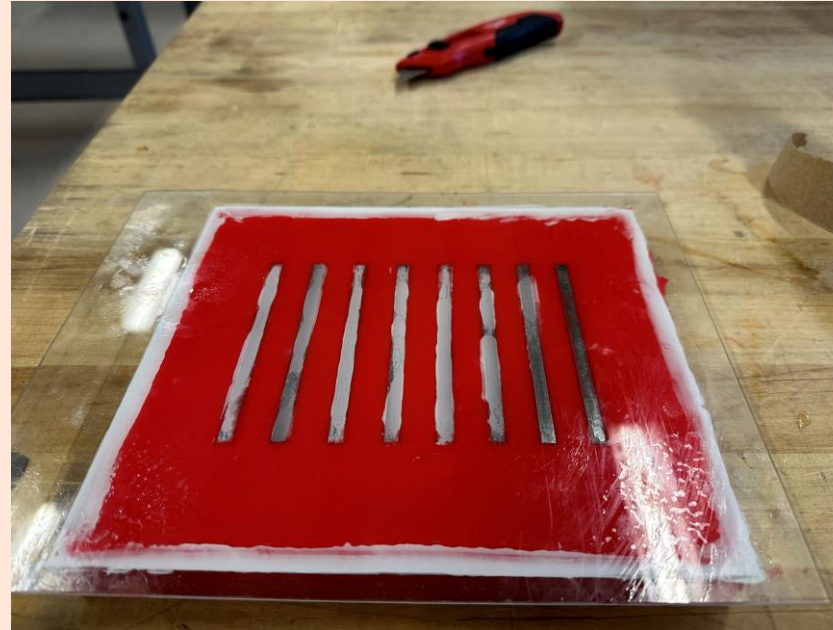
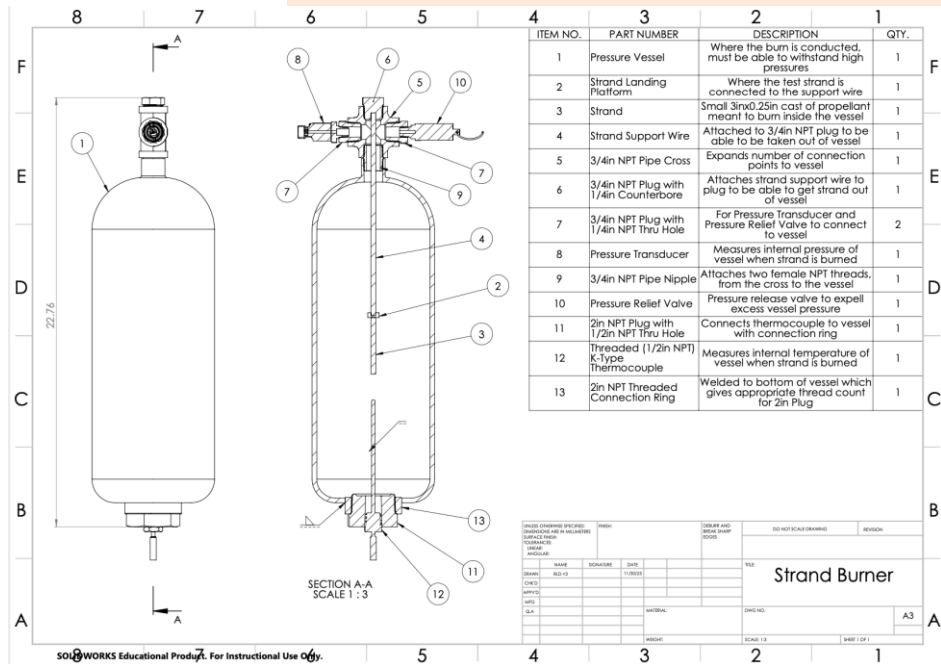


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Solar Shack Extrusion (15in)	Horizontal Beams	12
2	40mm Bracket	Connects Extrusion To Other Extrusion	36
3	0.25-20 in T-Nut	Slide-In Nut Allows The Extrusion To Be Fastened	152
4	1/4-20 - 1/2" Button Head Screw	For Use On Solar Shack Extrusion	104
5	0.25in Washer (0.625OD)	1/4" Washer	152
6	1/4-20 - 5/8" Button Head Screw	For Use On 4040 Extrusion (3ft)	48
7	4040 Extrusion (3ft)	Vertical Beams	4
8	Eye Bolt	Allows Test Stand To Be Secured With Support Wire	4
9	0.25-20 Nut	Threads On To Eye Bolt To Secure The Threads	4
10	Base Plate	Secures Load Cell And Distributes Load	1
11	Load Cell	Measures Created Thrust	1
12	M6x8mm Flat Head Screw	Secures Load Cell to Base Plate	3
13	Motor Holder	Holds Motor Concentricly, Options for 28mm-96mm	1
14	M2x2mm Set Screw	Secures Motor Holder to Load Cell	4
15	All Thread Brackets	Brackets To House Stabilizing Rods	4
16	1/2-13x9" All Threads	Stabilizes Motor And Keeps It Upright	4
17	Knob	Allows Easy Manipulation of Stabilizing Rods	4
18	20in Motor WITH Casing		1

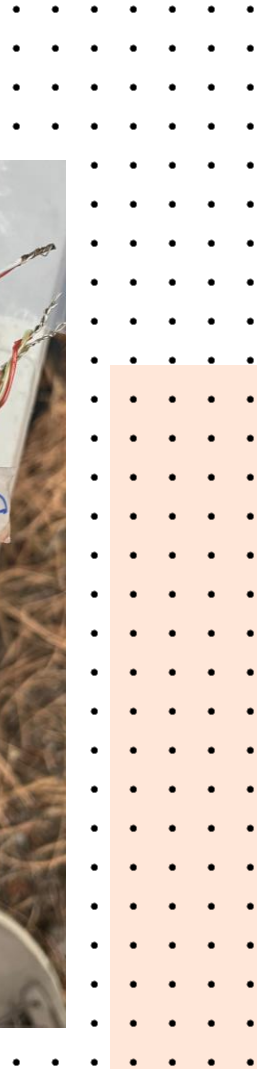
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UNLESS OTHERWISE SPECIFIED:		DATE	
DIMENSIONS ARE IN MILLIMETERS		DRAWN	RD 11/1/23
TOLERANCES:		CHECKED	
FRACTIONAL ±		ENG APPR.	
ANGULAR: MATCH ± BEND ±		MFG APPR.	
TWO PLACE DECIMAL ±		Q.A.	
THREE PLACE DECIMAL ±		COMMENTS: All Parts Listed Besides Support Cable And Stakes. Part 12 Hidden Under Base Plate	
INTERPRET GEOMETRIC TOLERANCING PER:		TITLE: Test Stand Final	
MATERIAL:		SIZE DWG. NO. REV	
NEXT ASSY	USED ON	B	
APPLICATION	DO NOT SCALE DRAWING	SCALE: 1:5 WEIGHT: SHEET 1 OF 1	

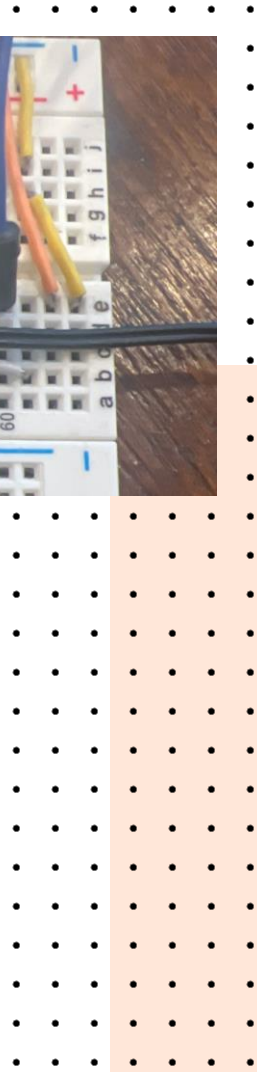
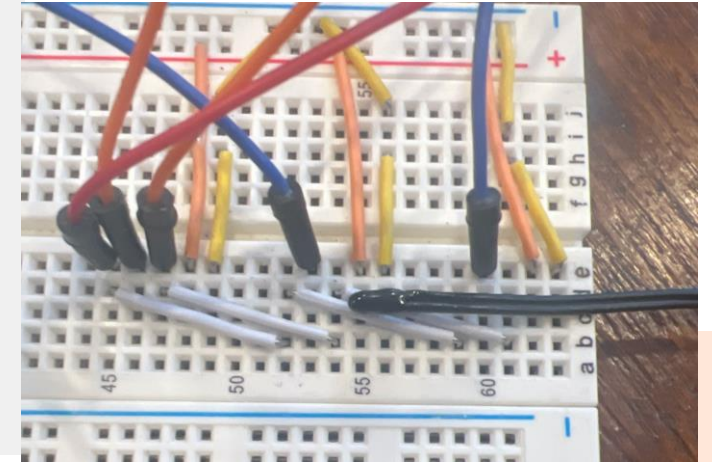
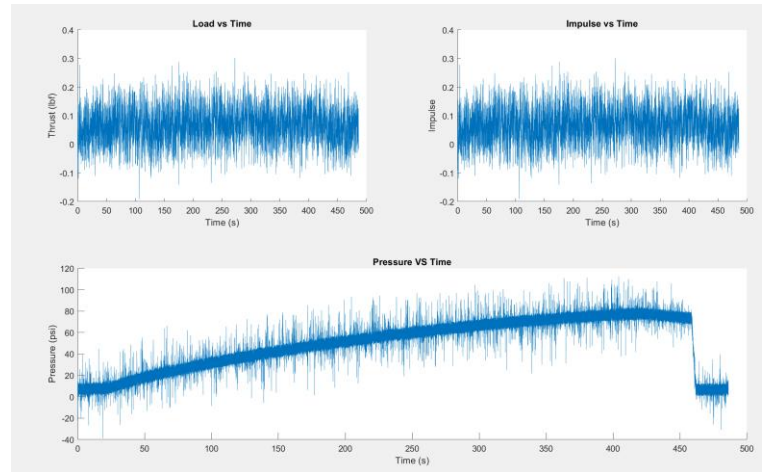
PRESSURE VESSEL STRAND BURNER



STRAND BURNER TESTING



STRAND BURNER TESTING



P R O P E L L A N T F O R M U L A S

Batch Sheet

Rocket Capstone Batch V2.2

Makes: 2 Strands in the custom mold, 0.25 in x 4 in

Chemical	Amount Planed(g)	Amount Used (g)
R45	4.62	
DOA	0.52	
Silicon Liquid	2 drop	
Aluminum	2.6	
Lamp Black	0.06	
AP Large	8.75	
AP Small	8.75	
MDI Curative	0.68	
Total	25.98	

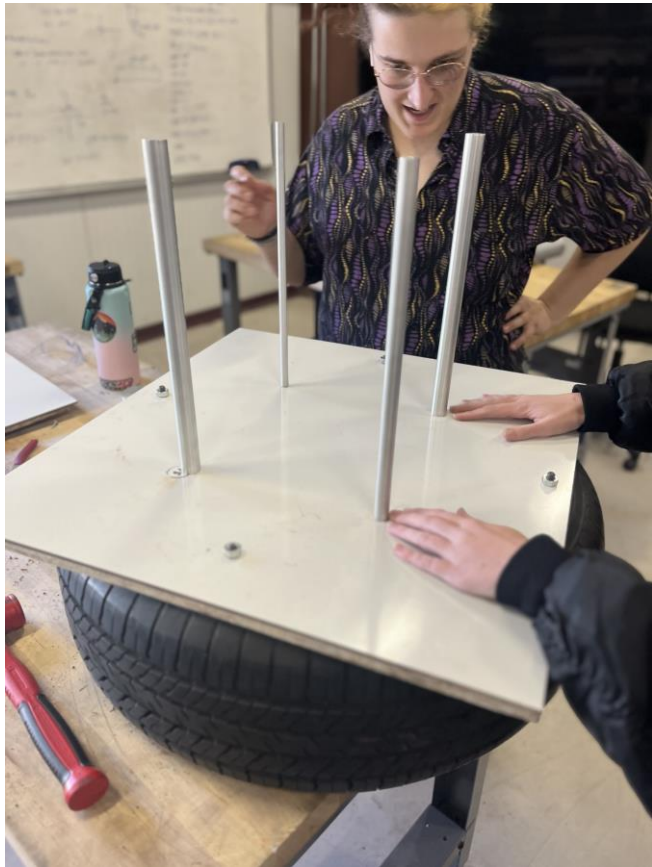
Notes:

Made by adjusting the rations in the modified V2 batch sheet -the Silicon liquid amount is guessed -AP amount is divided equally between large and small -keep all else constant adjust the ratio of AP to AL -2.25% DOA of total mass based on research paper in link below -87.1% for remaining mass is R45, 0% of remaining mass is DOA, 12.9% of remaining mass as in V1

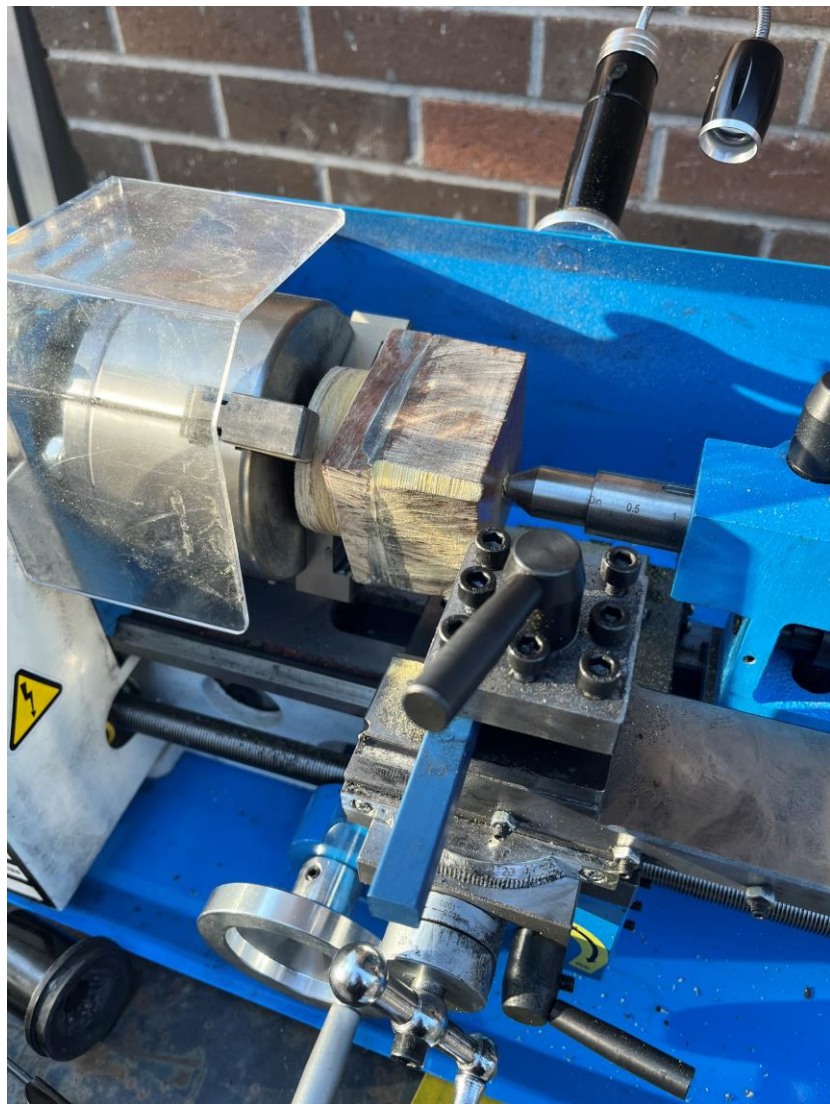
<https://pubs.aip.org/aip/acp/article-abstract/2366/1/040009/675922/Preliminary-results-of-DOA-plasticizer-effect-on?redirectedFrom=fulltext>

https://www.rocketmotorparts.com/details/p1577809_7835874.aspx

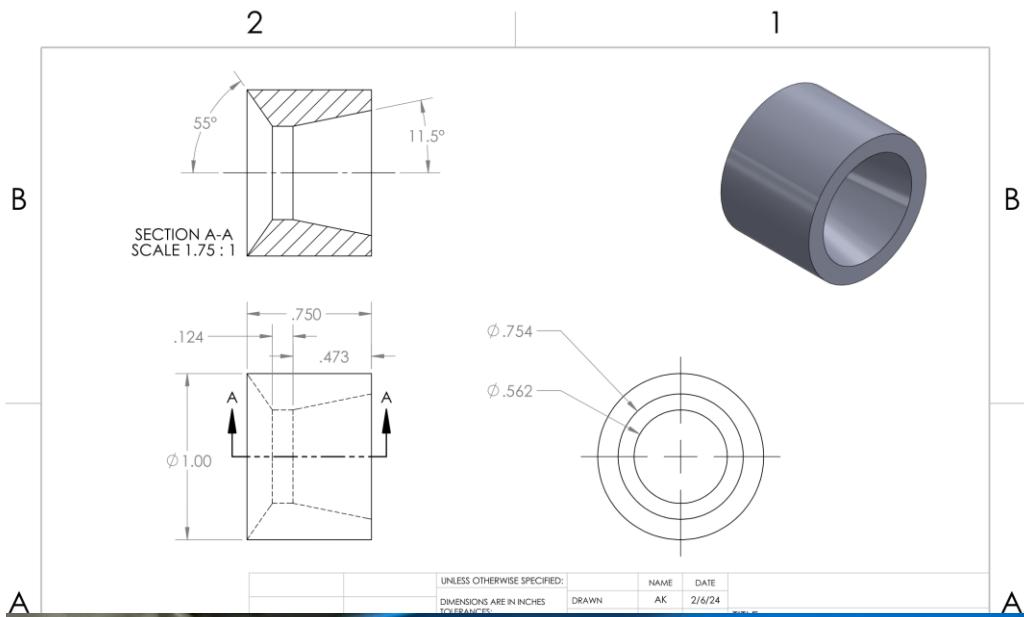
PROPELLANT MOTOR CASTING



NOZZLE MANUFACTURE



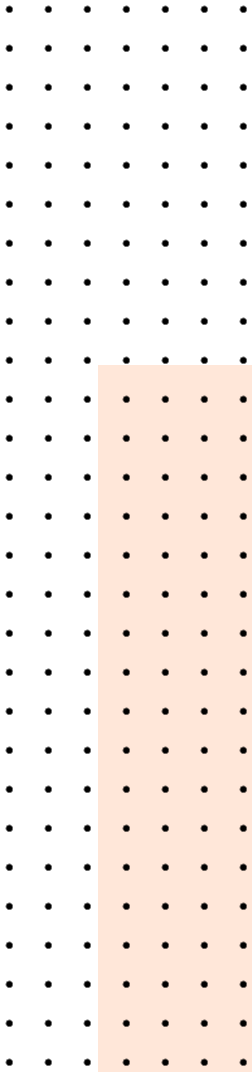
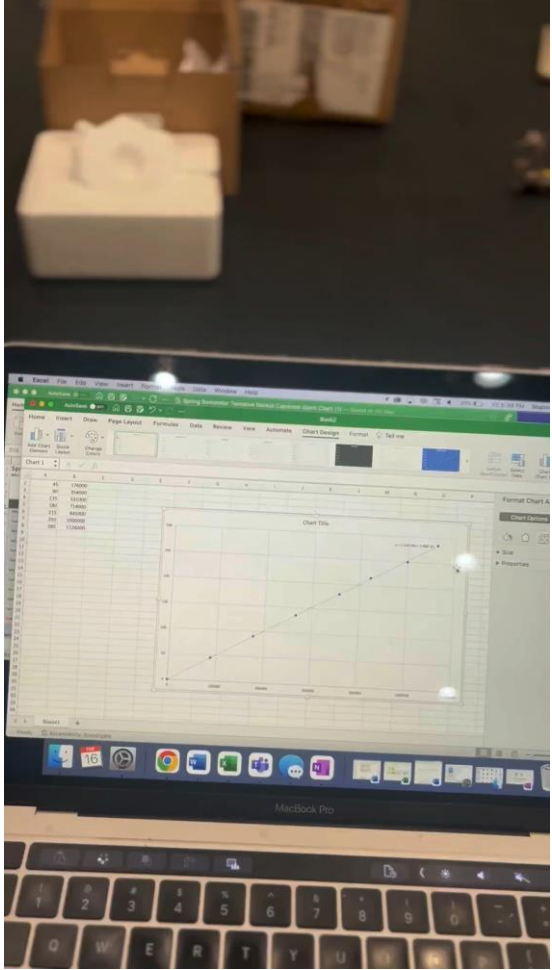
NOZZLE MANUFACTURE



BULK HEADS



LOAD CELL AND CALIBRATION





GANTT CHART AND BOM