



BE BOLD. Shape the Future.
College of Engineering

Mission/SOW

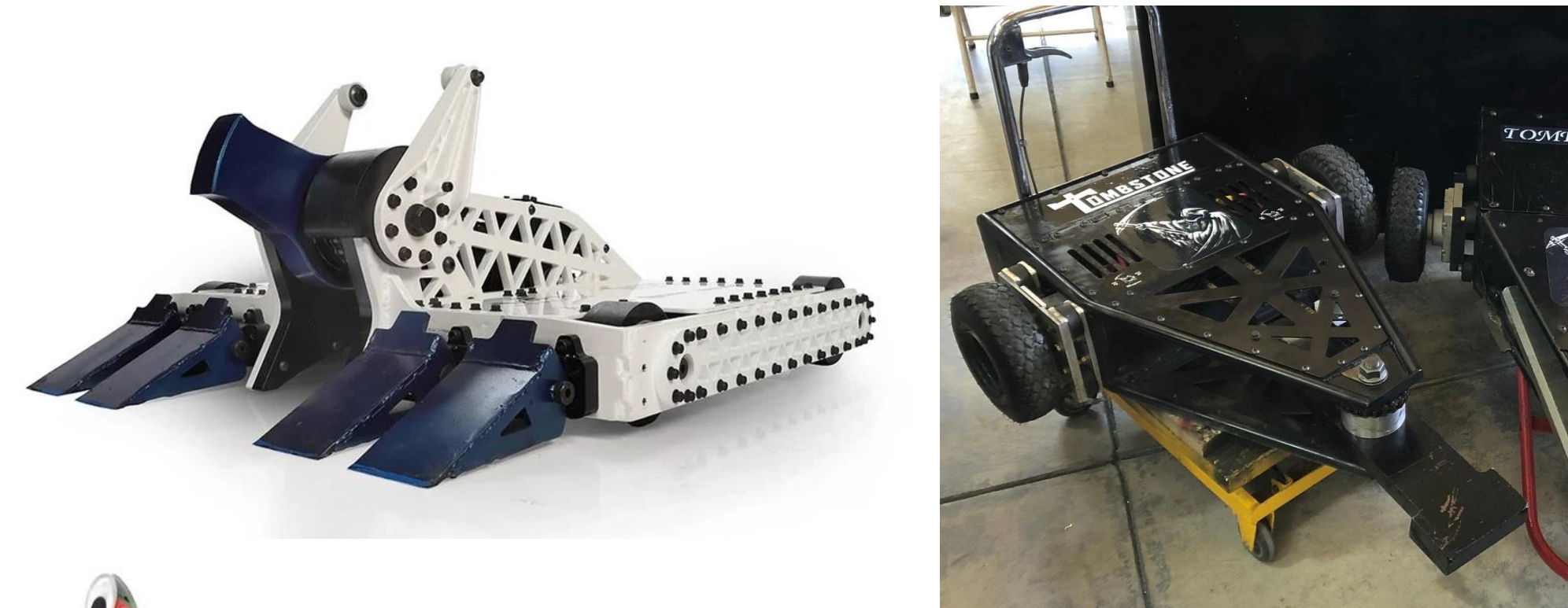
NMSU requested the R&D of a BattleBot to compete and win the Miner Mayhem competition with the following criteria:

- Design and build 3lb combat robot
- Must include one active weapon
- Operational life of 3 minutes
- Repairable in 20 minutes
- Follow all SPARC safety and building standards

The team worked to meet and exceed all expectations of our client and to take home a trophy.

Research

- Reviewed SPARC competition standards which dictated 9 main weight classes
 - 150g, 1lb, 3lb, 12lb, 30lb, 60lb, 120lb, 110kg, 250lb
- Observed and realized the main entry weight class varied from 150g to 3lb and controlled by RC drone equipment
- Investigated typical chassis material of Aluminum, Polycarbonate, and Carbon Fiber
- Explored the distinctive weapon systems for 3lb and below: Vertical Spinners, Horizontal Spinners, Full Body Spinners, and Flippers
 - Flippers for power to weight ratio
 - Horizontal spinners for blunt damage
 - Vertical spinner for maximum rotational damage
 - Full body spinners for immediate weapon connection upon body contact
- Examined countermeasures including side and back fins, extruded foam, low profile forks/narrow wedge

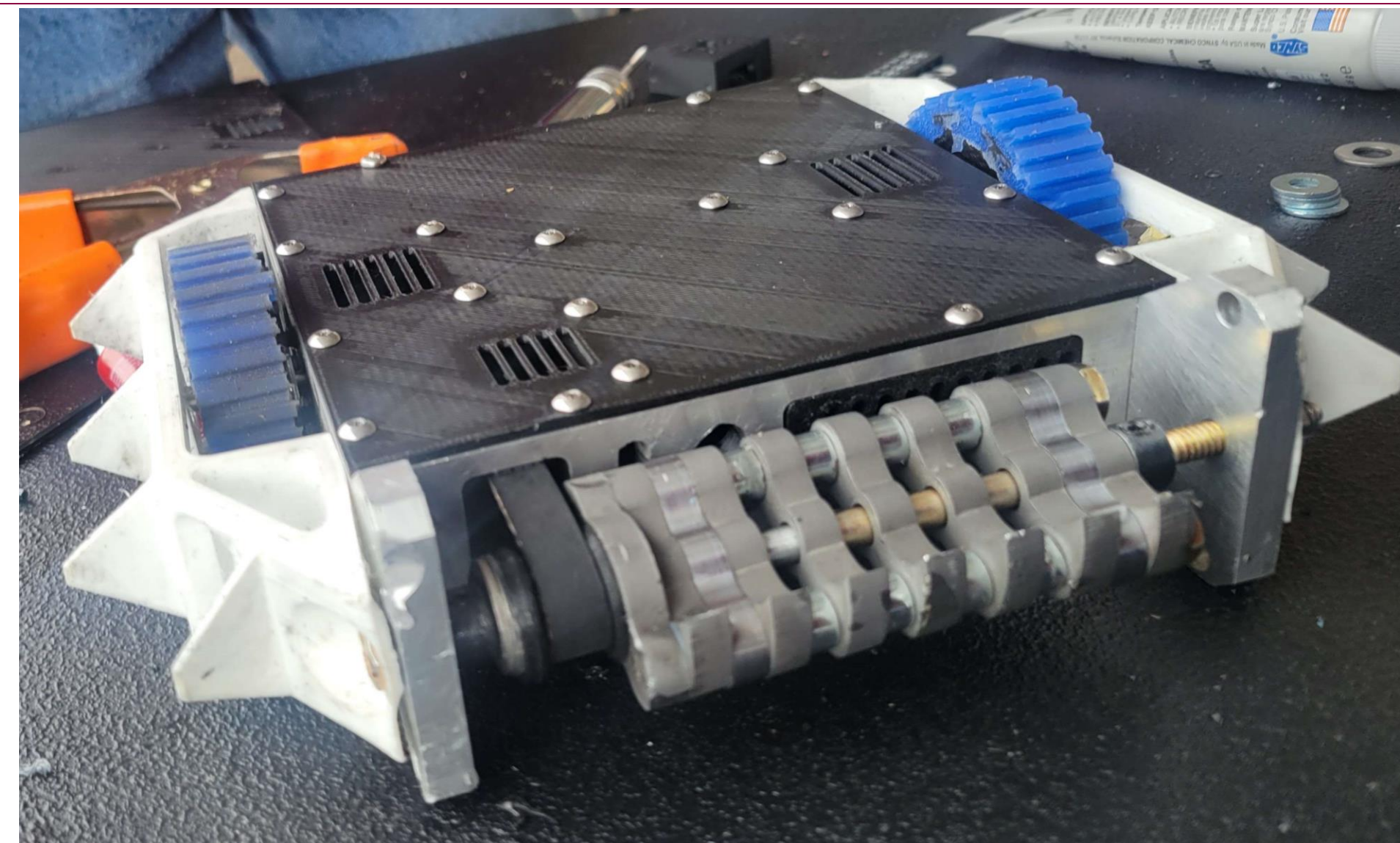


BattleBots –Aggie Team

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New Mexico State University

Final Design



Chassis

- Two internal side walls featuring front-end vertical protrusion for the protection of the weapon
- Front and back wall containing multiple slots for reduced weight, pulley and kill switch access
- Made from 6061 Aluminum for optimization of minimum weight and maximum protection
- 9/16-in top/bottom clearance for inverse handling
- External side walls made from TPU to reduce weapon impact and maintain distance
- Top and bottom plates made from PETG and contain vents for convective heat transfer

Weapon System

Made from AR500 blades and steel spacers, initial designs had full spacers while final design had small collars

Pulleys made from PETG with neoprene timing belts

Driven using a 20A ESC for a 2600 kV motor

Movement System

Wheels constructed using 3D-printed mold

Inner hub: 3D printed in PETG for rigidity

Outer hub: Molded silicone casting for traction

Two wheel installed on the bot

Each wheel powered by 20A ESCs for 24-mm 1500 kV motors

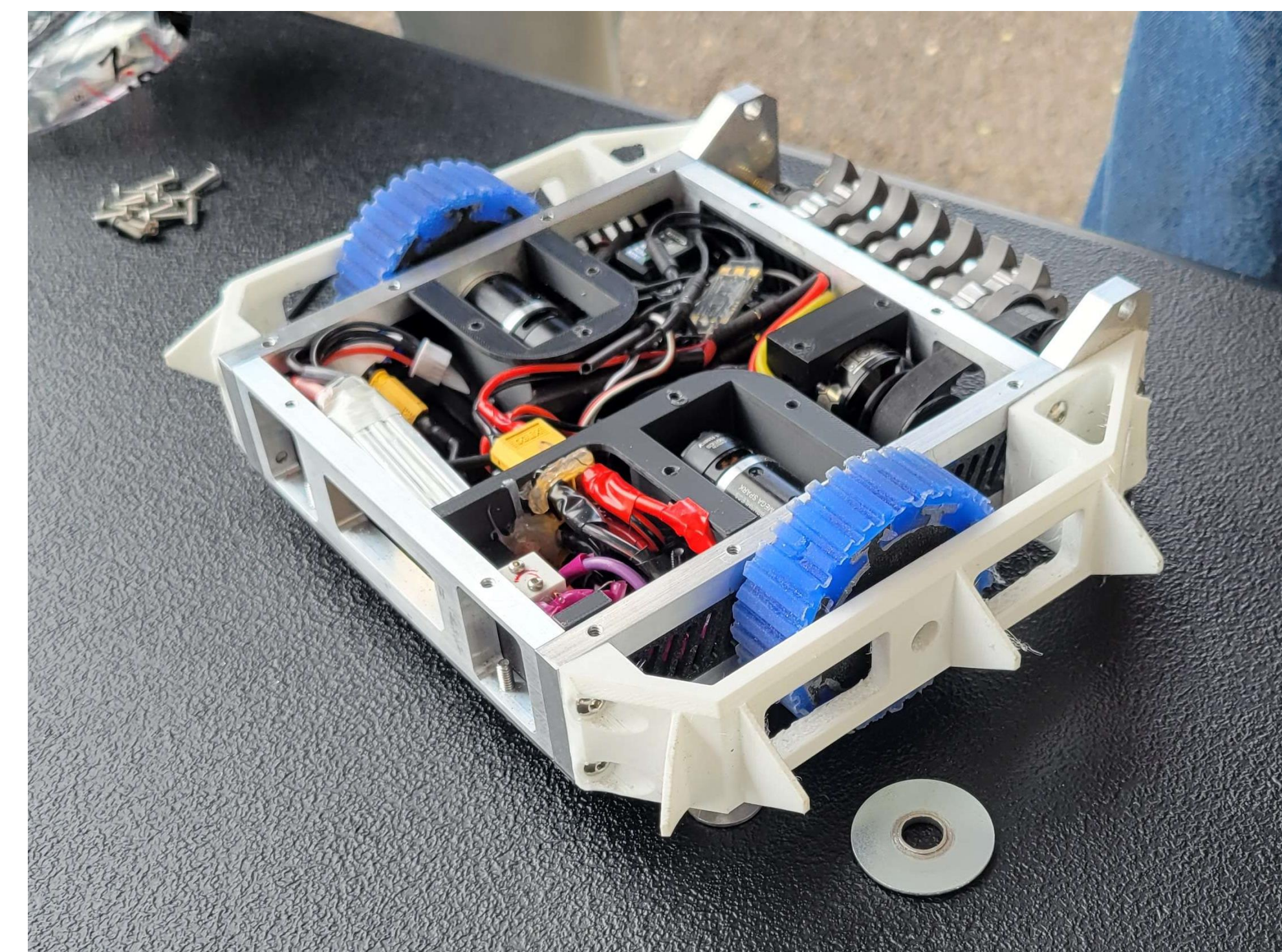
Electronics

Contained in the back right of the robot for easy replacement if damaged

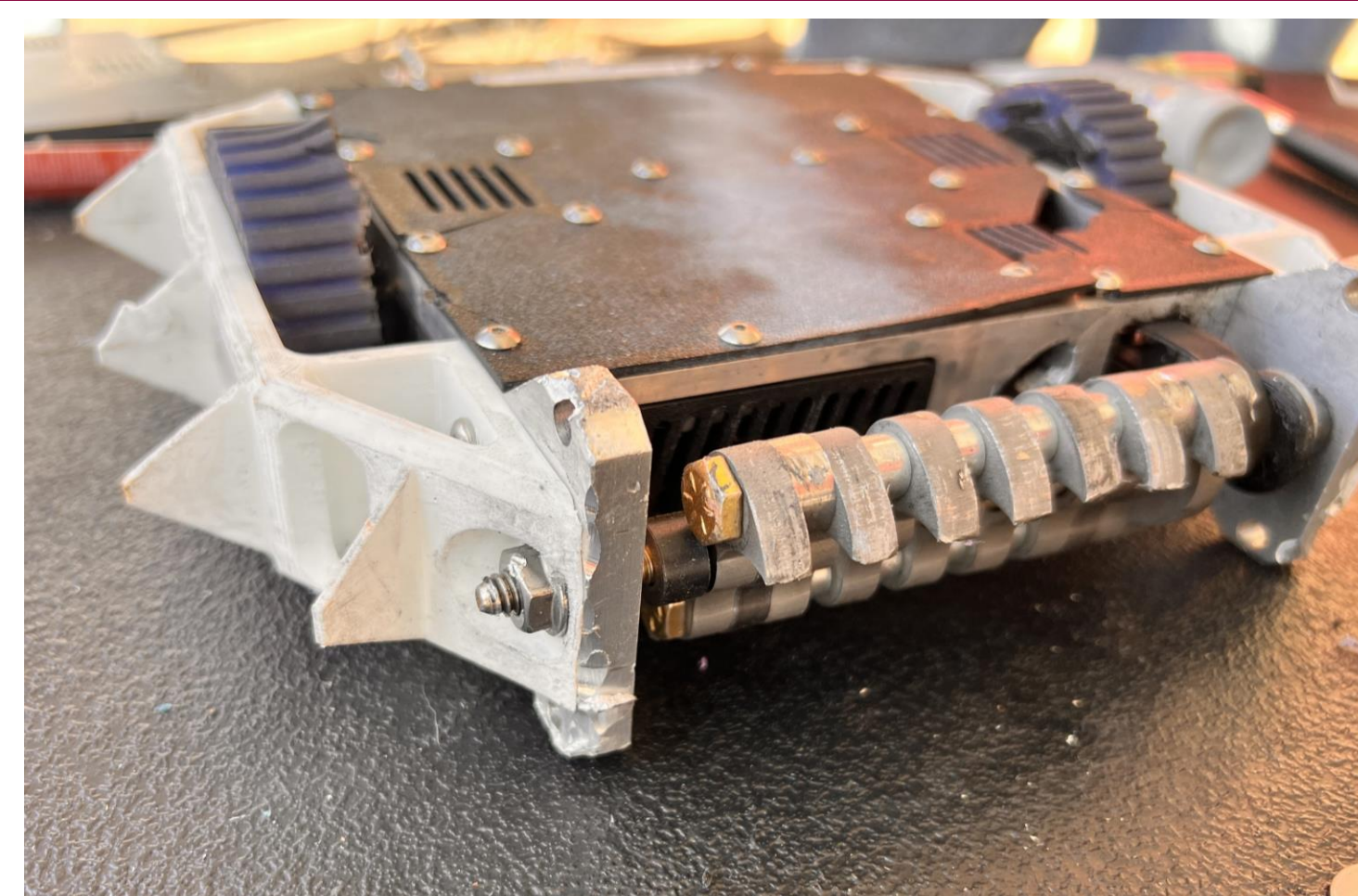
Made up of 14-gauge wire and LED indication light turned on by switch on back side of robot

Three cell 650-mAh battery used for two brushless wheel motors and one weapon motor

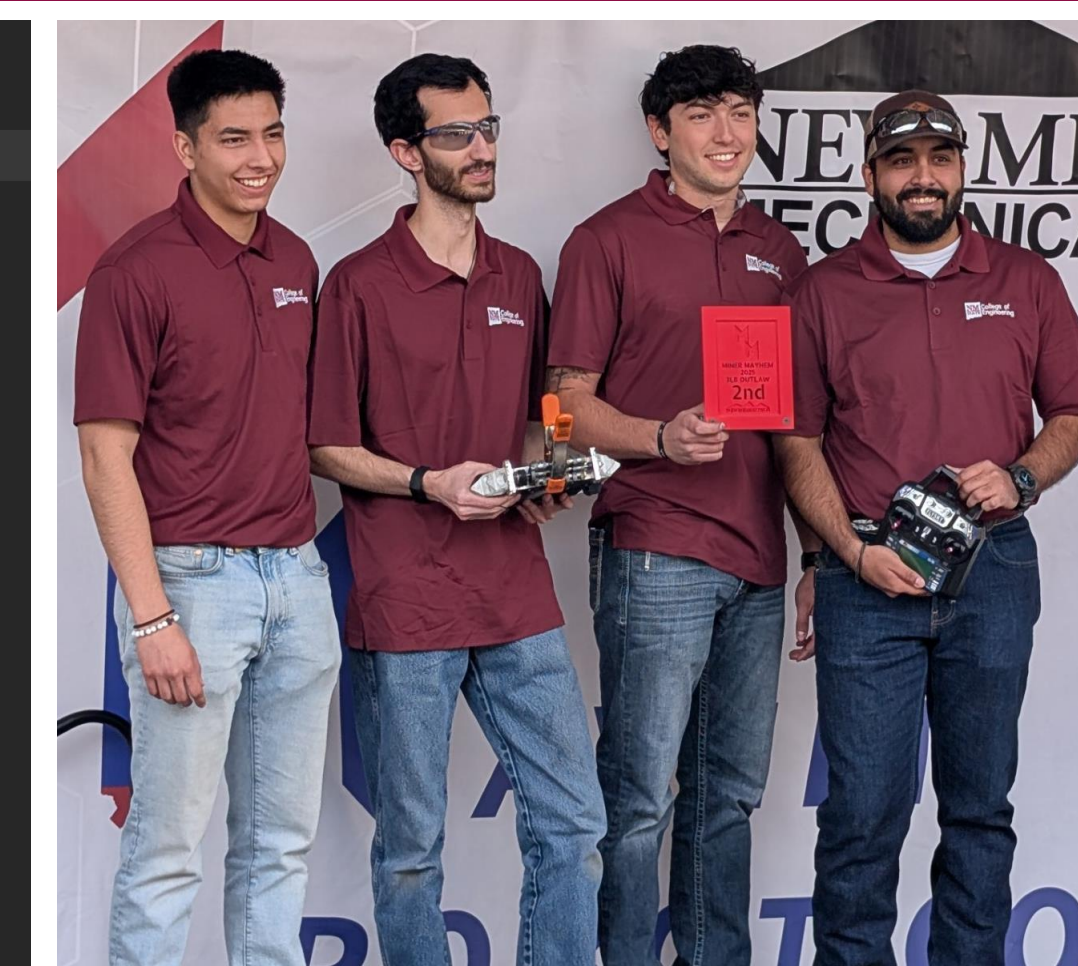
Priority was to create space for ESCs in the main body of the robot



Competition Results



3lb Outlaw (Mayhem 2025 Bracket)		
Round 1	Semifinals	Finals
Smoke Cheddar 10	Smoke Cheddar 10	Smoke Cheddar 20
Mozzarella Questions 0	Three Tapper 8	Doug 7
Three Tapper 14	Friendzone 3	
Butterkave 13	Doug 18	
Skybot 0		
Friendzone 22		
Doug 22		
Flipoff 0		

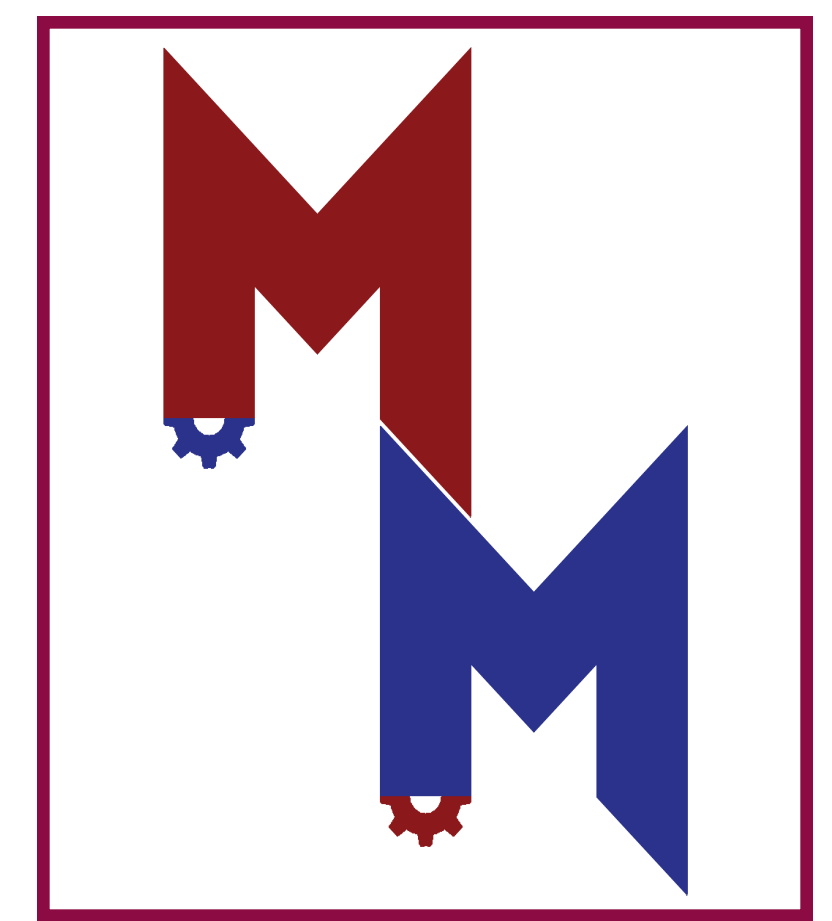


Group Stage

- First round disabled movement and electronic system of opponent for KO
- Second and third round won by judge's decision primarily from weapon damage
- Successfully repaired all damages to the robot
- Attained #1 seed with 3-0 record and 65 points

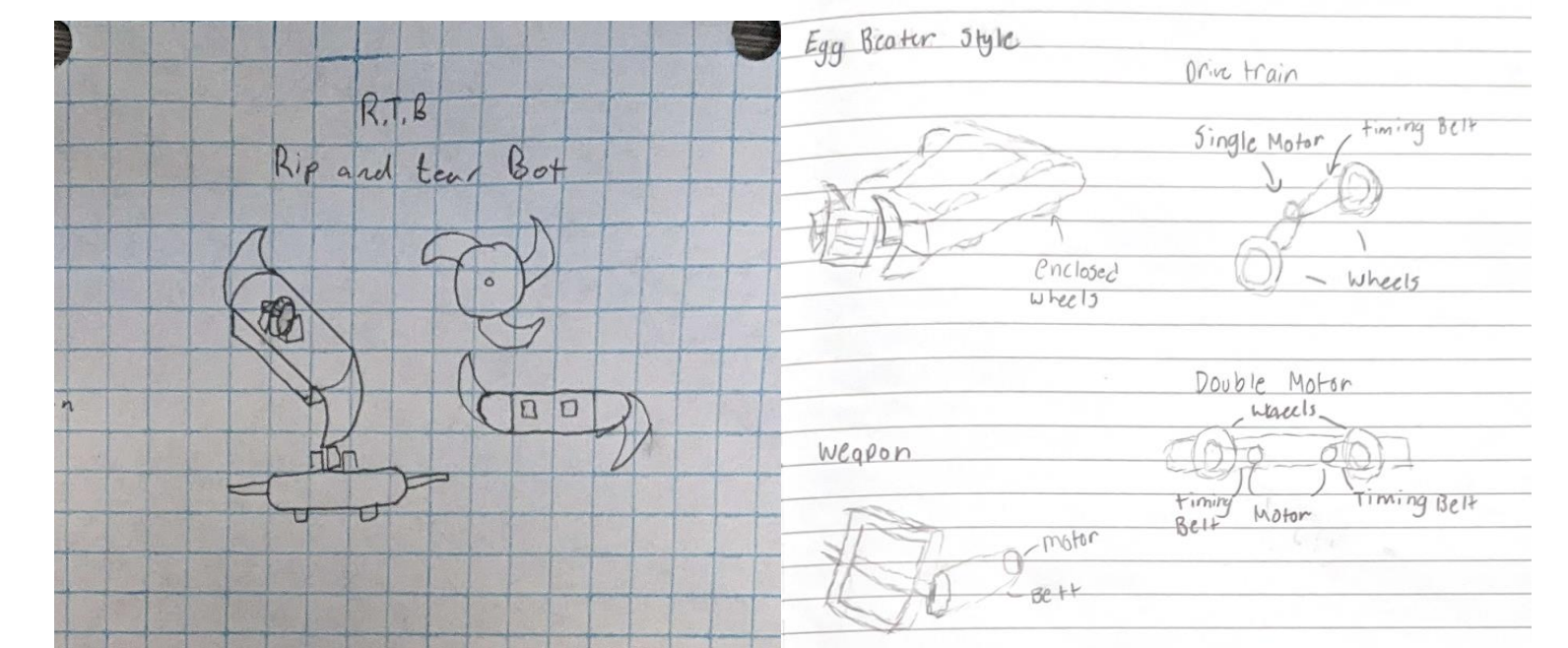
Bracket Stage

- Won via KO in round one against a flipper bot
- Won via judge's decision from aggression and weapon damage in the semifinals
- Lost in finals due to pulley shattering
- Achieved 2nd place in the 2025 NM Tech Miner Mayhem Event

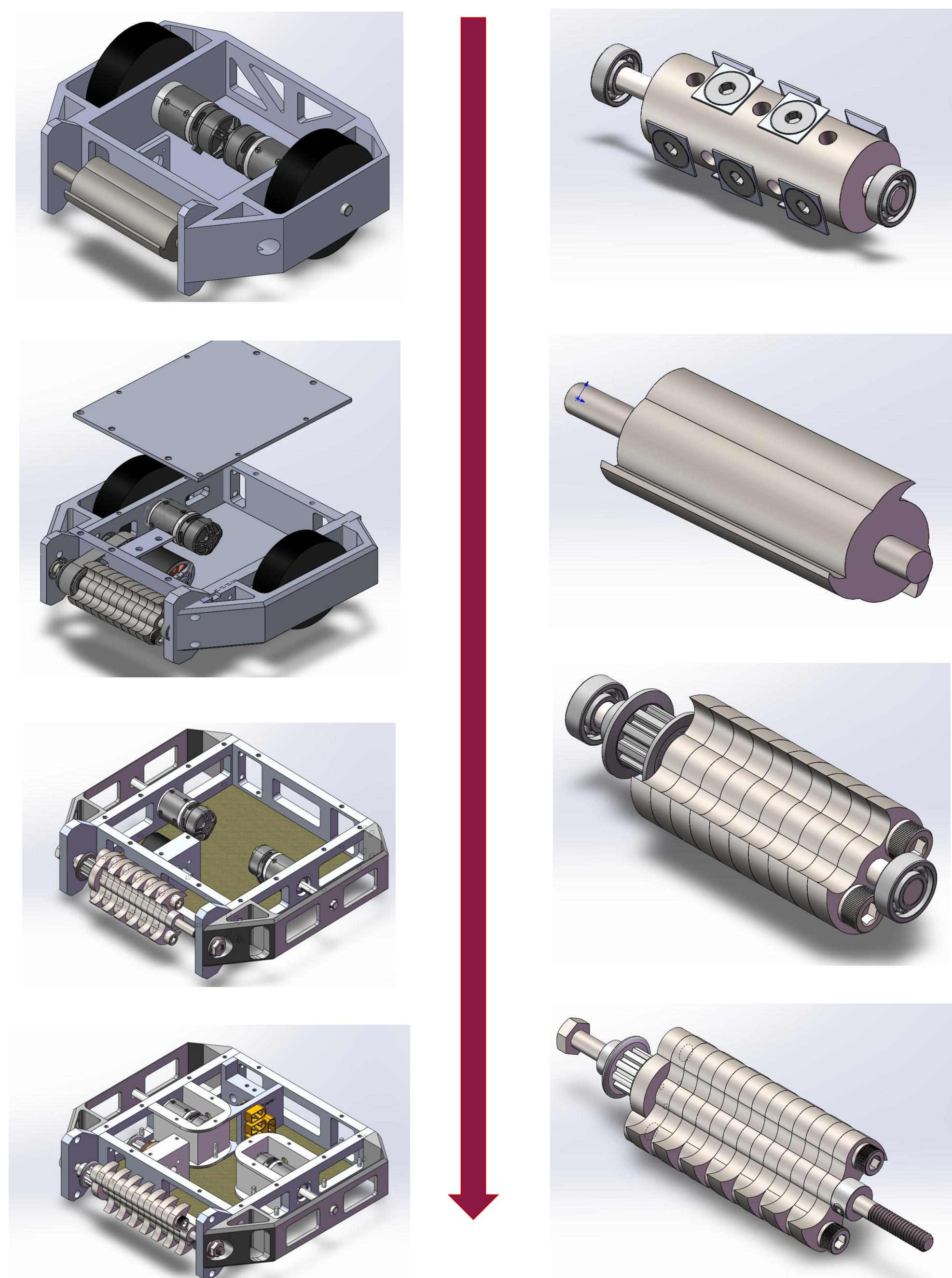


Concept Development

- Original designs
 - Vertical Spinner
 - Fully Body Spinner
 - RTB (Rotating Top Bot)- #1 pick discarded because of inner frame and weight
 - Egg Beater/Drum Bot – Secondary final option



Four Design Iterations for Bot and Weapon



References

- https://battlebots.fandom.com/wiki/BattleBots_Wiki-Main_Page
- <https://www.onlinemetals.com/en/battlebots-choosing-right-material>
- <https://www.onlinemetals.com/en/combat-robotics-weapons-and-armor#bba>
- <https://youtu.be/wSwuph2TEII?si=yzPH6xk182tayl1r>