TECHNICAL BINDER

2026

"MR. PEABODY"

GAME ANALYSIS

REBUILT presents the challenge of shooting foam balls (FUEL) into the HUB. Our teams goal this season was to build a competitive robot within our scope and qualify for the World Championship. To achieve this, we need the following:

Qualifications

- Maximize throughput utilizing the outpost to win matches
- Winning matches awards the most ranking points
- Get enough throughput to solo accomplish the ENERGIZE ranking point.

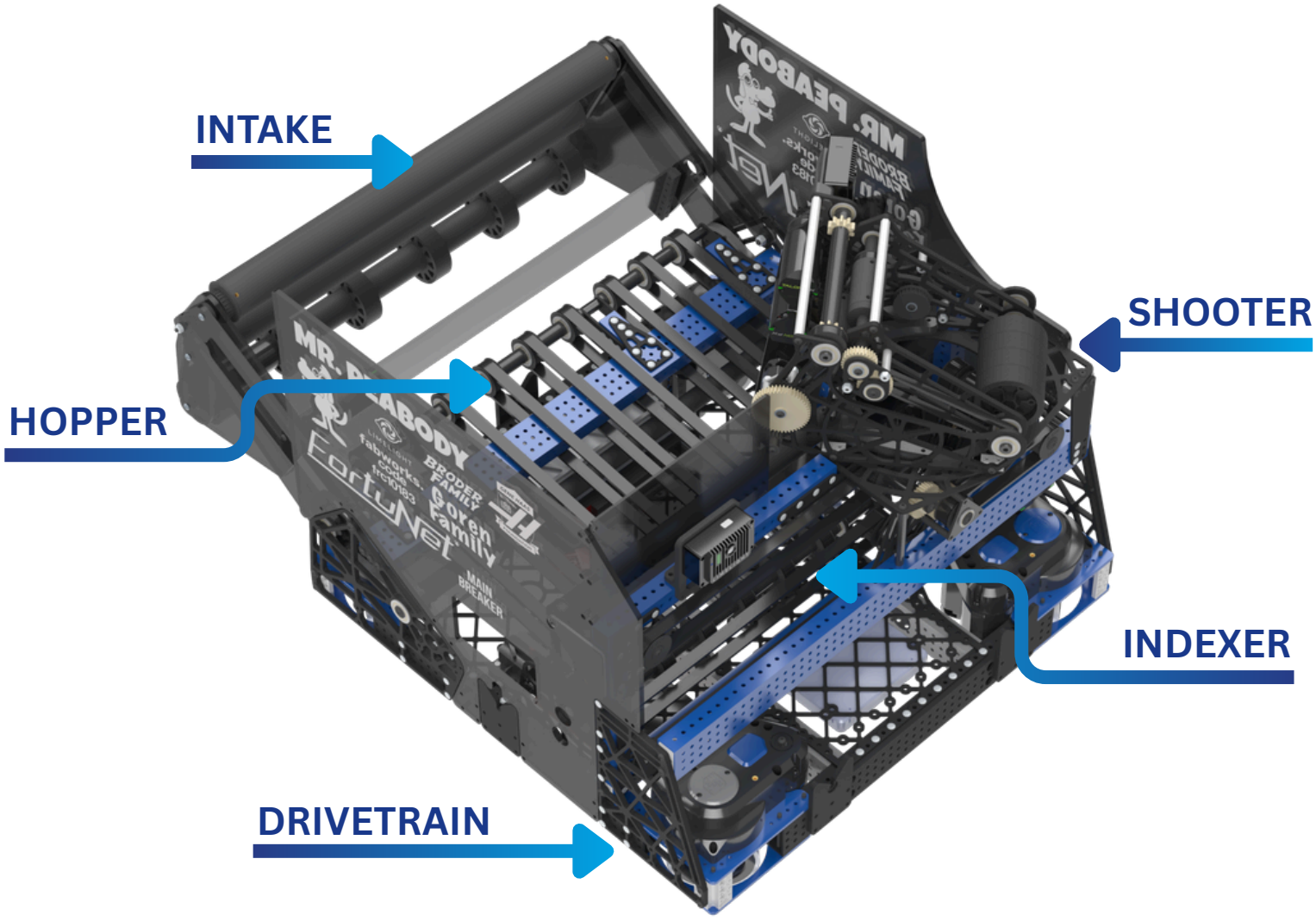
Ranking points are as follows

- WIN - *3 Ranking Points*
- ENERGIZE - 100 FUEL Scored - *1 Ranking Point*
- SUPERCHARGED - 360 FUEL Scored - *1 Ranking Point*
- TRAVERSAL - 50 Climb points - *1 Ranking Point*

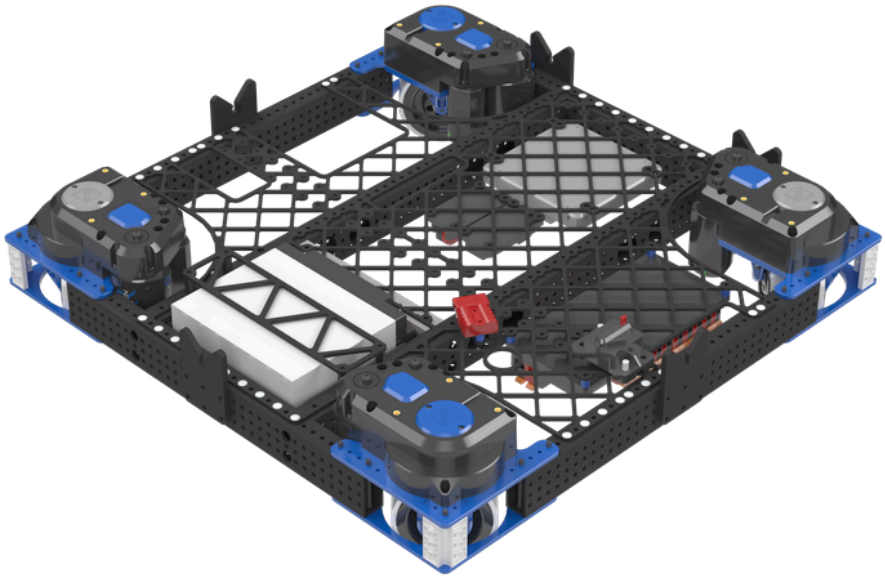
This season we decided to focus on FUEL throughput over climbing as we found in more valuable to winning the match.

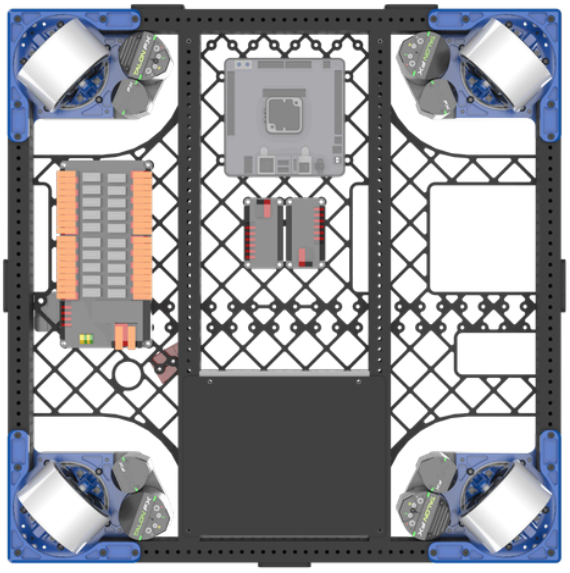
Our design and strategy decisions were made based on this game analysis

ROBOT OVERVIEW



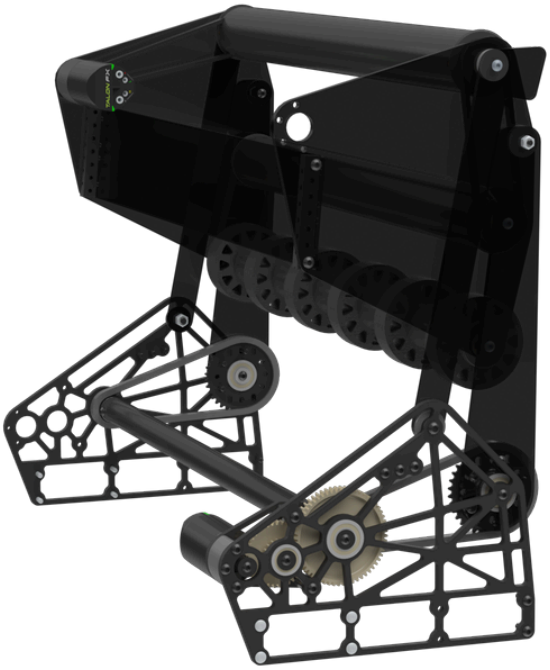
DRIVETRAIN

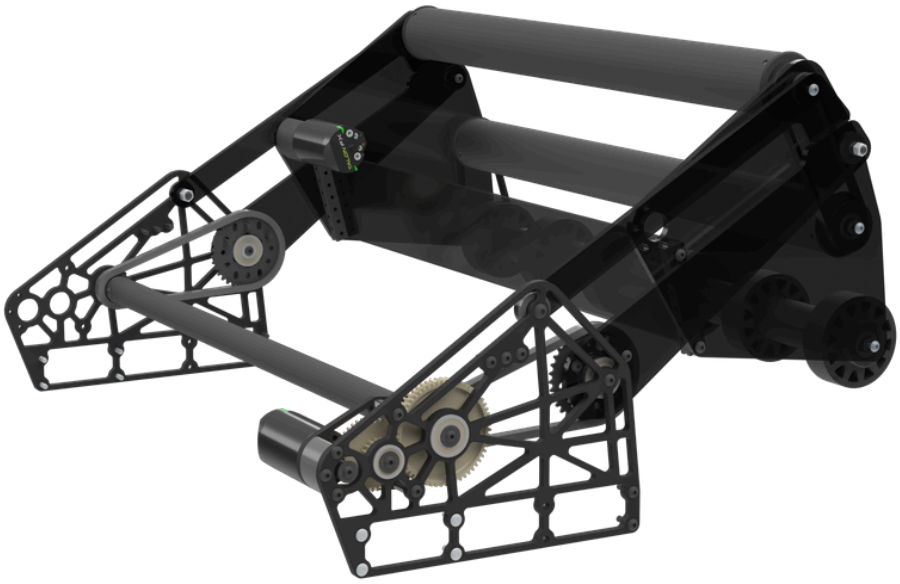




- **Drivetrain Structure**
  - 26.5" x 26.5" drivetrain footprint providing a stable base for the robot.
  - Bumper mounting integrated into the outer plates, simplifying bumper installation and removal.
- **Frame Members**
  - Two 2" x 1" aluminum tubes used as crossbars and primary mounting surfaces for internal subsystems.
    - Provides structural rigidity while creating mounting points for mechanisms.
- **Bellypan**
  - 1/8" aluminum bellypan with weight-reduction pockets to lower overall robot mass.
    - Adds stiffness to the drivetrain while supporting internal components.
- **Electronics Layout – “Brainpan” Configuration**
  - All major electronics are mounted underneath the robot on the bellypan.
    - Centralizes wiring and components into a single protected area.
    - Keeps the upper structure clear for mechanical subsystems and reduces wiring complexity.

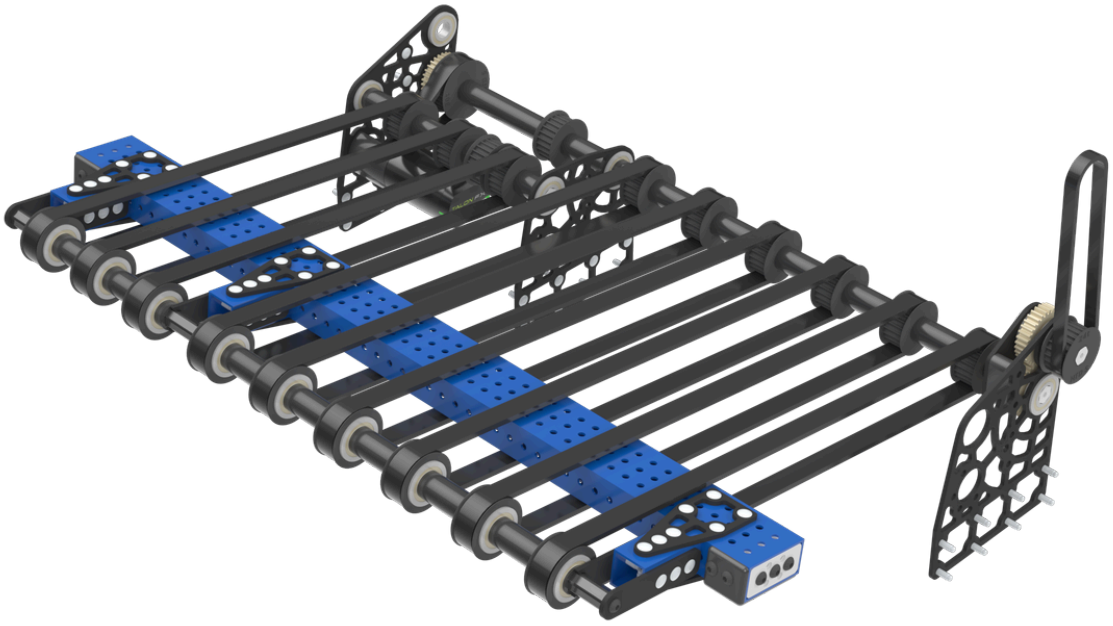
INTAKE





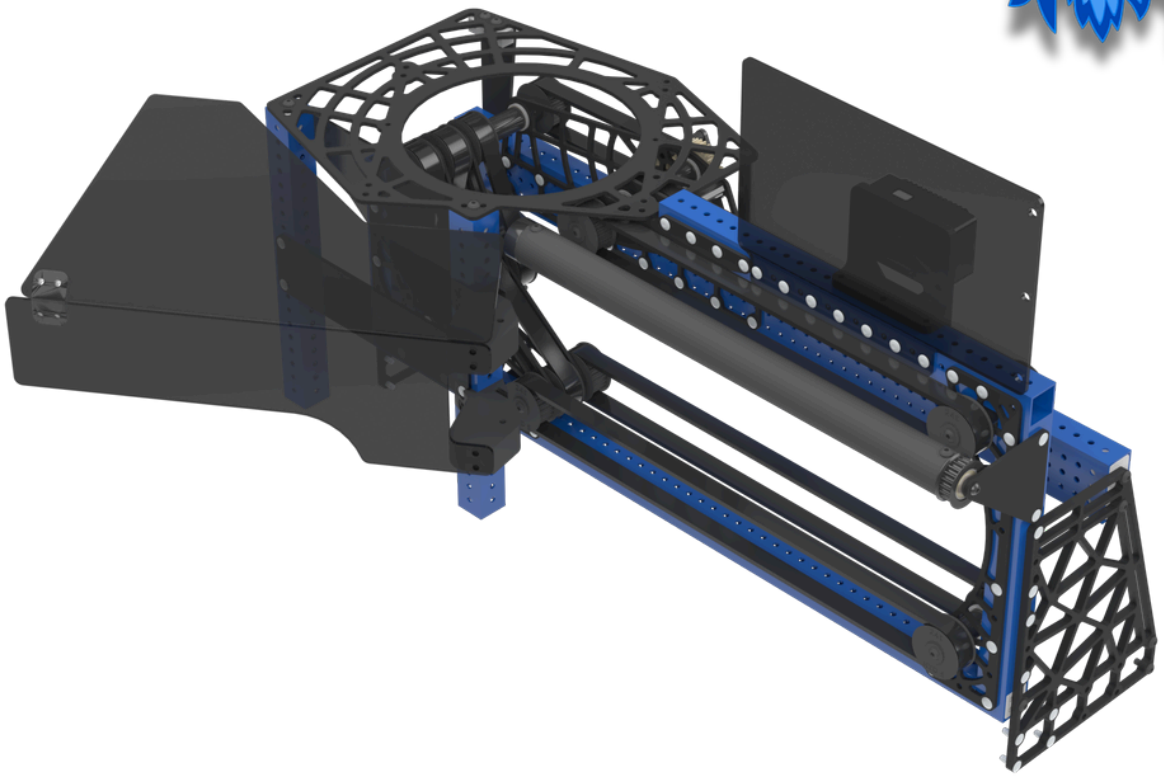
- **Four-Bar Linkage**
  - Pivot driven by a Kraken X44 with a 30:1 reduction for controlled deployment and retraction.
  - Four-bar geometry allows the intake to store high inside the frame perimeter.
    - Extends to the correct height and angle for consistent FUEL acquisition.
- **Rollers**
  - Powered by a Kraken X44 with a 2.67:1 reduction.
    - Provides fast FUEL acquisition while maintaining enough torque to prevent stalling.
  - Rollers use polycarbonate tubes on WCP stub shafts to reduce weight while maintaining durability.
    - Top rollers: 2" diameter polycarbonate tubes.
    - Bottom roller: 1.25" polycarbonate tube with stretched 3" flex wheels for increased compliance and grip on FUEL.
- **Intake Ramp**
  - A ramp integrated into the intake helps guide FUEL into the rollers.
    - Reduces the time FUEL contacts the bumper.
  - Improves intake speed and reliability against bumper friction

HOPPER



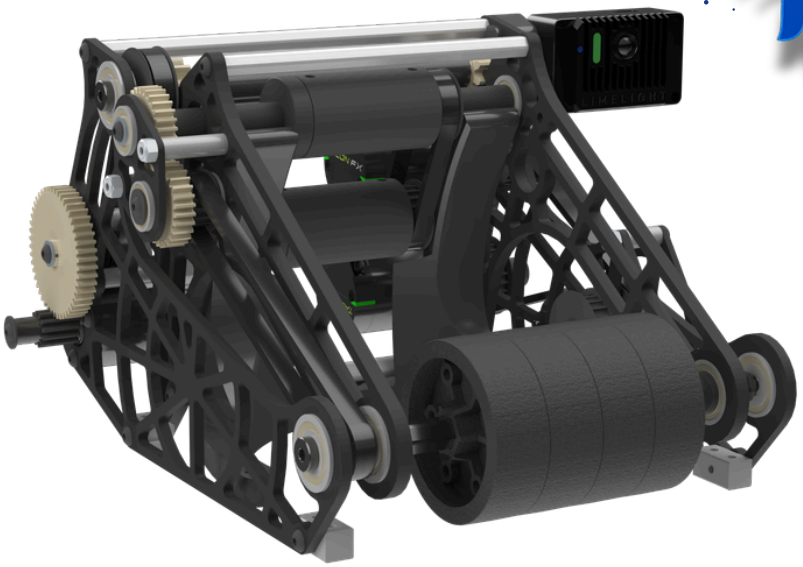
- **Belt Floor Conveyor**
  - Composed of nine 15 mm wide HTD 5 mm belts that move FUEL from the intake into the robot.
    - Multiple parallel belts increase contact area to move FUEL smoothly and prevent jams.
  - Powered by a Kraken X44 with a 2:1 reduction to provide reliable throughput without stalling.
- **Front Roller Support**
  - The front shaft is supported by a dead axle roller.
    - Improves rigidity of the conveyor assembly.
    - Helps maintain consistent belt alignment and tension.
- **Hopper Walls**
  - Made from 0.25" polycarbonate for durability and impact resistance.
    - Include 0.125" pockets to clear and integrate with existing plate geometries.
  - Designed to retain FUEL during high-speed driving and capture FUEL as it transitions from the intake into the hopper.

INDEXER



- **Belt Tunnel Conveyor**
  - Design inspired by Team 118 “The Robonauts” 2017 robot Ruckus.
  - Powered by a Kraken X60 with a 2:1 reduction to increase torque and maintain consistent FUEL throughput.
    - Uses a top and bottom belt system to control the FUEL during transport.
      - Prevents the belts from simply spinning the FUEL in place, ensuring forward movement through the tunnel.
  - The belt path curves upward to smoothly feed FUEL into the shooter.
- **Ball Shield**
  - Inspired by Team 1690 “Orbit” 2026 robot Kepler.
  - Guides FUEL into the indexer entrance.
  - Prevents jams and misalignment as FUEL transitions from the belt tunnel.
    - Maintains smooth, continuous flow of FUEL through the robot.
- **Top Roller**
  - Positioned above the hopper exit to help feed FUEL into the indexer.
  - Maintains consistent spacing and timing of FUEL entering the indexer.
  - Provides additional control over FUEL as it transitions from the hopper into the indexing system.

SHOOTER



- **Flywheel Shooter**
  - Powered by two Kraken X44 motors on a 1:1 reduction to maximize flywheel speed.
  - X44s were chosen over X60s because their higher free speed keeps the shooter closer to peak power at typical shot RPMs, allowing faster recovery between shots.
  - Belt tensioners increase pulley wrap to improve power transfer and reduce slip.
- **Shooter Wheel**
  - Uses a 3" urethane flywheel for reliable grip on FUEL.
  - No added inertia, allowing the motors to recover RPM quickly after each shot.
- **Shooter Geometry**
  - Shooter fixed at approximately 39°, allowing scoring from the OUTPOST zone without a turret.
  - Simplifies the mechanism and allows optimization for human player feeding.
- **Powered Counter Rollers**
  - Two 1.5" polycarbonate tube rollers driven 1:1 act as counter rollers.
  - Increase energy transfer into FUEL for improved shot consistency.
- **Adjustable Hood**
  - Adjustable from 33.7° to 75° (~41° range), mainly used for passing and trajectory adjustment.
  - Hood pivots on a custom 10DP gear rack machined into the plate, driven by a Kraken X44 with a 113.33:1 reduction for precise control.
- **Limelight Mount**
  - Limelight 4 mounted on a shooter ear bracket, aligned with the shooter for accurate targeting.
  - Enables pose updates during shooting cycles and optional tx-based aiming.
  - TPU 3D printed mount improves impact resistance.