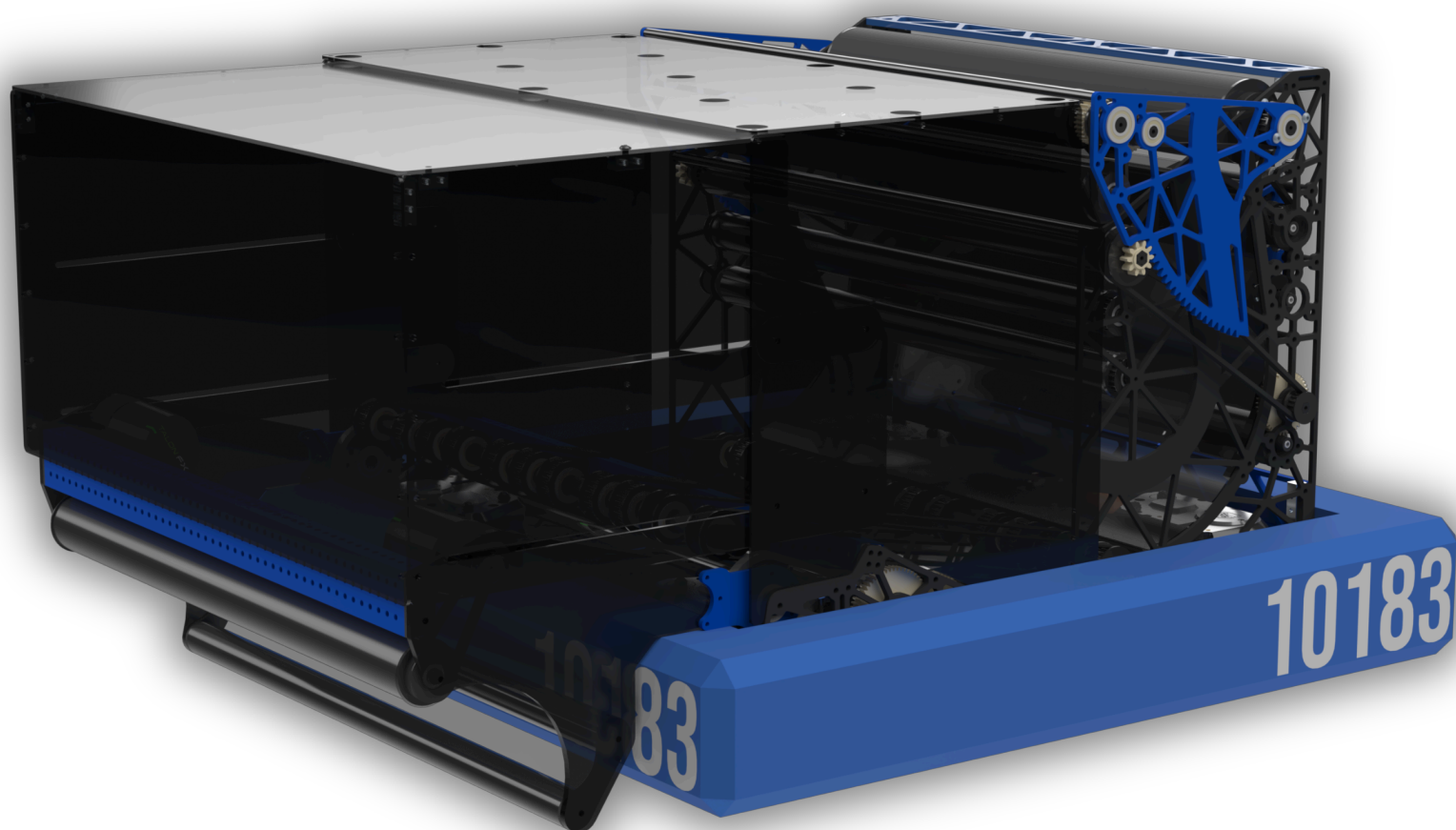




# TECHNICAL BINDER



2026  
"DUG"

# 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 to win matches
- Winning matches awards the most ranking points
- Get enough throughput to solo accomplish the ENERGIZE and heavily contribute for the SUPERCHARGED ranking point.

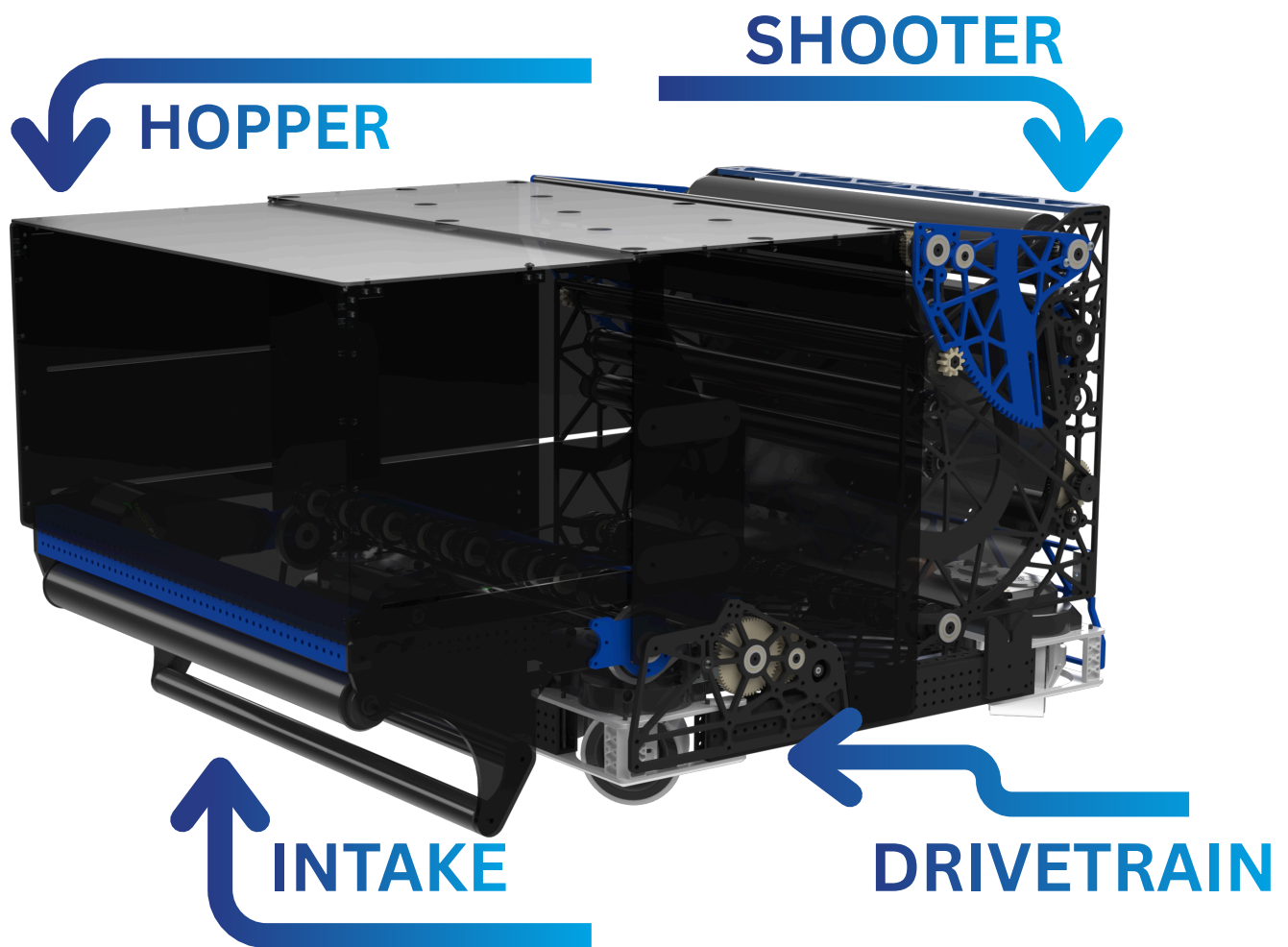
## Ranking points are as follows

- 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*

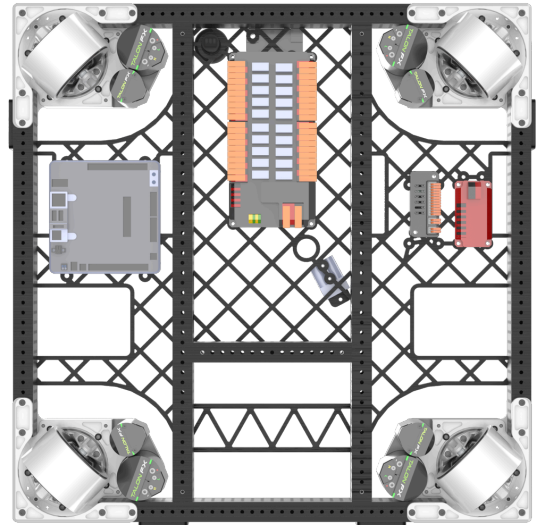
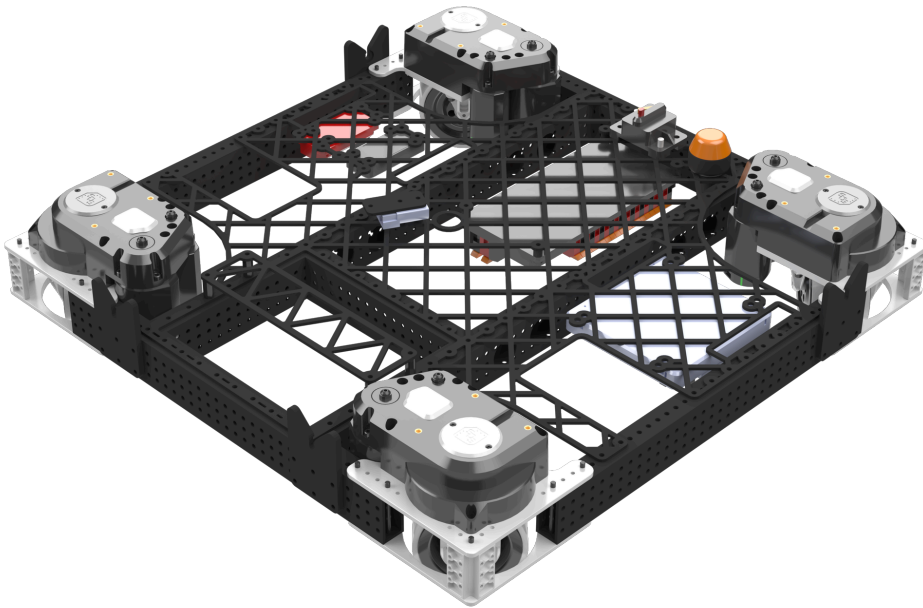
This season we decided to focus on FUEL throughput over climbing as we found in more valuable to winning the match.

***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**

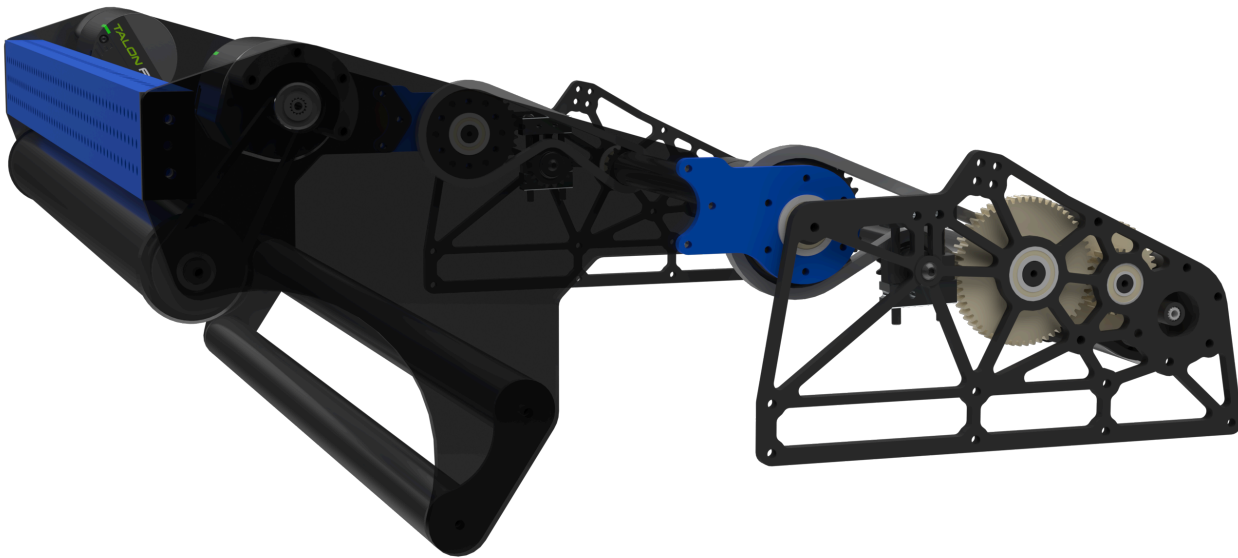
- 1/8" aluminum bellypan with weight-reduction pockets to lower overall robot mass.
- Adds stiffness to the drivetrain while supporting internal components.

- **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



- **Slap-Down Intake Assembly**

- Uses a **slap-down style intake** for fast deployment and consistent ground contact.
- Pivot is driven by a **Kraken X60 on a 31:1 reduction**, selected after the previous robot's X44 struggled at a similar reduction.
- Increased torque ensures **reliable deployment and holding under load**.

- **Intake Roller System**

- Features a **2" polycarbonate rollers wrapped in silicone tubing** for improved grip and compliance on **FUEL**.
- Powered by two Kraken X60 motors to provide strong, consistent intake performance.

- **Kicker Bars**

- Equipped with two static kicker bars positioned ahead of the roller.
- Covered in cat tongue material to increase grip on **FUEL**.
- Prevent direct roller contact, reducing slowdown from friction while maintaining **consistent compression and controlled intake**.

- **Chain Reduction & Tensioning**

- Final reduction uses a **chain-driven system with a custom tensioner**.
- Designed to support a **short chain run with a high range of motion**.
- Chosen over a turnbuckle-style system to maintain **consistent tension throughout intake movement**.

# HOPPER



- **Belt Floor Conveyor**

- Composed of **eleven rubber-coated HTD belts** to increase grip on **FUEL**.
- Belts are **evenly spaced** to organize FUEL into **rows of four**, optimizing feed into the drum shooter.
- Increased contact area improves **control and jam resistance** during transfer.
- Powered by a **Kraken X60 with a 2:1 reduction** to provide higher torque and consistent throughput under load.

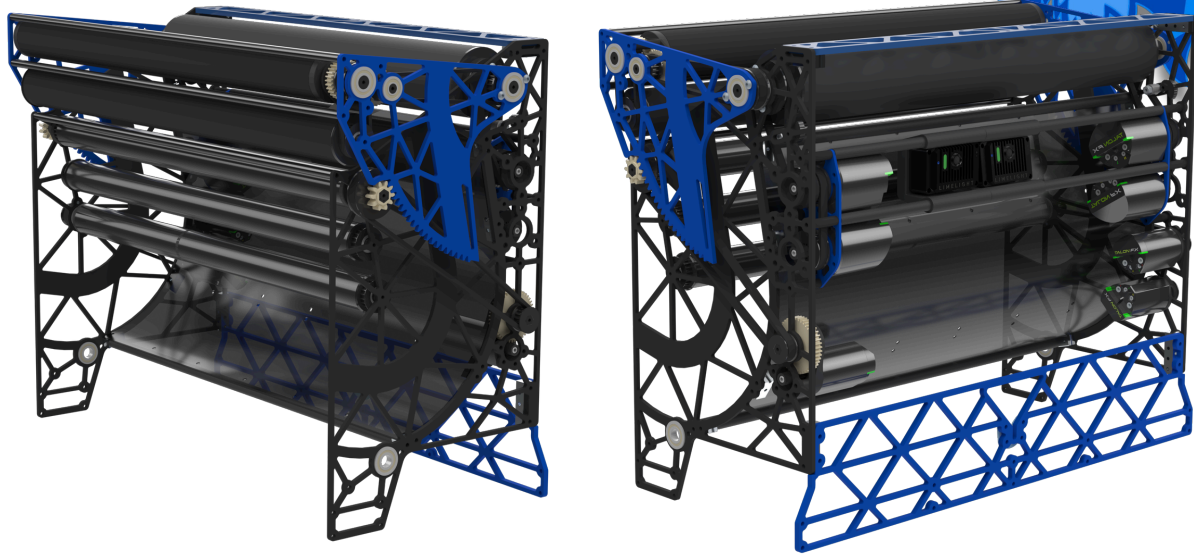
- **Front Roller Support**

- The front shaft is supported by a **dead axle roller**.
- Improves **rigidity of the conveyor assembly**.
- Maintains consistent **belt alignment and tension**.

- **Hopper Walls**

- Made from **0.25" polycarbonate** for durability and impact resistance.
- Designed to **slide outward to expand hopper capacity**.
- Retains **FUEL during high-speed driving** and captures it smoothly from the intake into the conveyor system.

# SHOOTER



- **Uptake**
  - Simple 3-roller system using polycarbonate rollers on a 1:1 reduction.
  - Powered by two Kraken X44 motors for fast and consistent throughput.
  - Rollers are covered in cat tongue material to increase grip on FUEL.
  - Designed to accelerate FUEL directly into the shooter, minimizing delay and reducing the chance of jams.
- **Drum Shooter**
  - Full-width **drum-style shooter** designed to handle high throughput and multiple **FUEL** simultaneously.
  - Main roller is a **3" diameter steel tube (1/16" wall)** coated in **silicone sleeving** for consistent grip.
  - Steel construction increases **rotational inertia**, allowing up to **four FUEL** to be shot at once with consistent velocity.
- **Counter-Rotating Rollers**
  - Two **2" steel rollers**, also coated in silicone, act as **backspin counter rollers**.
  - Improve **energy transfer and shot consistency** by controlling FUEL compression and exit behavior.
- **Shooter Drive**
  - Powered by **four Kraken X60 motors on a 1:1 reduction**.
  - Provides the torque and recovery needed to maintain speed during **multi-ball firing**.
- **Vision System**
  - Uses **two Limelight cameras** for robust targeting.
  - One is mounted **perpendicular to the ground with a modified lens** for a wider field of view.
  - The second is **tilted upward ~15°** to detect tags at close range near the hub.
  - Dual-camera setup ensures **reliable vision tracking across multiple distances and angles**.
- **Adjustable Hood**
  - Hood angle ranges from **3° to 40°**, allowing the robot to make shots from **varying distances**.
  - Custom 140T 10DP Gear Rack cut into Hood plates
  - Driven by a **Kraken X44 on a 96:1 reduction** to provide precise and stable positioning.
  - High reduction ensures **fine control and repeatability** of shot trajectories.

