TEAM BEAN 1833

2026 Technical Binder

CLOVER

NICE TO MEET YOU

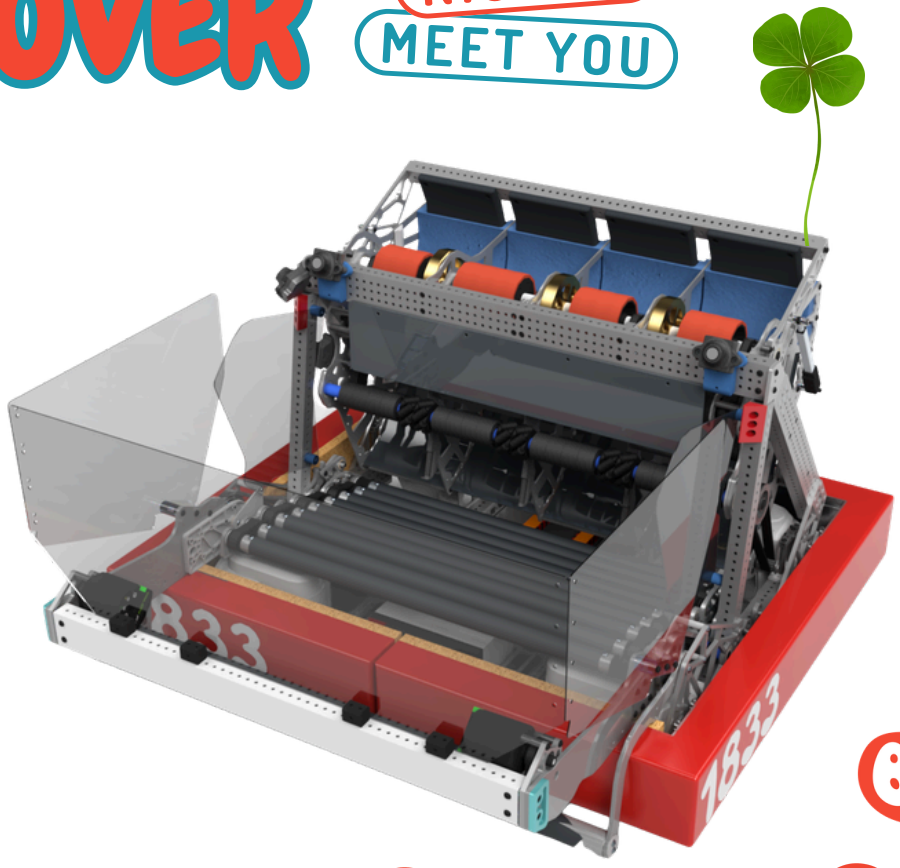


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STRATEGY

- One of the first things we did after kickoff was identify what would most likely be the dominant strategies of the game.
  - We determined that a hybrid between defense, cycling, and passing would be optimal, and that robots on each alliance may need to fill a different niche in any given match.
    - Thus, we saw that a robot that can accomplish these tasks most efficiently and being able to fill any role was going to be a winning robot.
    - So, we ended up prioritizing FUEL throughput — which we discuss later upon the specific techniques that we used to achieve very high throughput — allowing us to be a very dominant scorer and passer.

- Another thing we decided on very quickly is that in order to be able to dominate a match, we needed to have as many cycling routes as possible, and make sure we couldn't easily be defended.
  - This led us to of course choose a shortbot design, allowing us to fit underneath the trench, increasing our possible paths from 4 to 16 total cycling paths.

- With us being short, fast, and having high throughput, we felt that we didn't really need to even climb, as with our desired hopper capacity of around 50 FUEL, a full cycle would be more points per second than even an L3 climb, which we would have to significantly alter our robot's architecture for.

- In summary, from the start we wanted to dominate the game, shift between cycling and passing when necessary, and prioritizing as high of FUEL throughput as possible, all while ignoring climbing.

PROGRAMMING

"The team that speaks the language of robots, even though the robots never understand"

Using programming concepts to automate robot processes.

- **Dynamic Auton:** Creates highly customizable autonomous routines in Elastic Dashboard, giving us incredible flexibility with autonomous routine options. This gives us a strategic advantage when planning autonomous routines with alliance partners by providing flexibility and synergy with any team.

- **Operator Controls:** Control robot modes and validate inputs to assist our driver and robots with complex tasks.

- **Shoot On The Move:** We use an iterative time-of-flight algorithm to shoot while moving. This algorithm gives us an adjusted target to aim for that accounts for the robot's velocity. Shoot on the move makes us harder to defend and also makes every cycle more efficient. This is especially useful in autonomous mode: we can move towards the trench while unloading our hopper, letting us go back to the neutral zone for a third time.

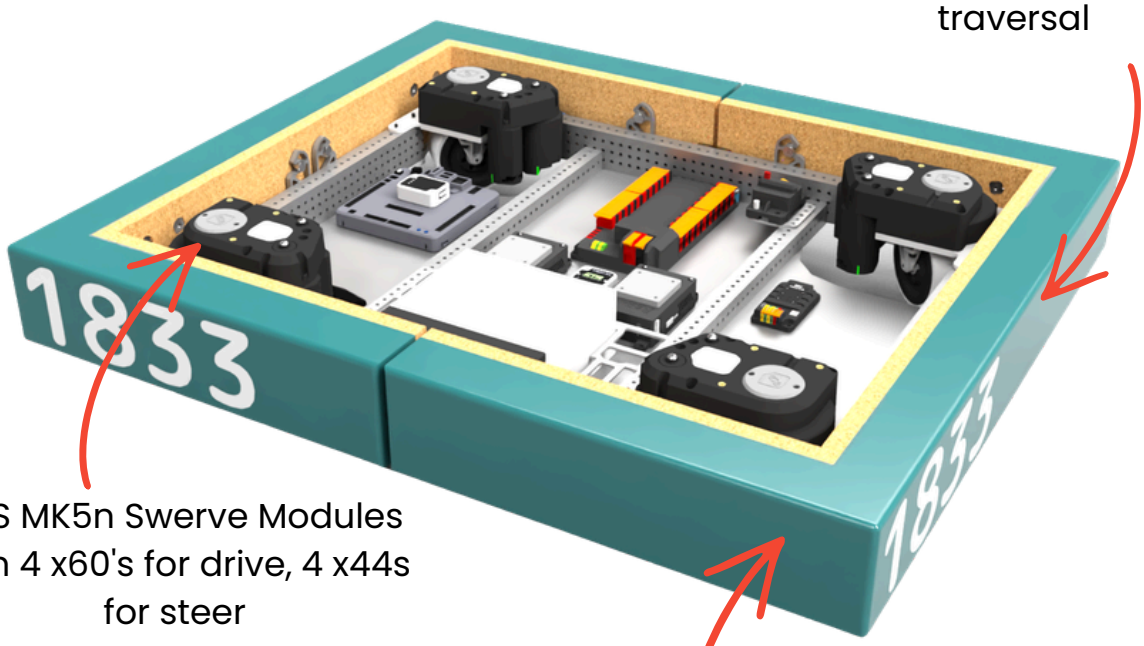
- **Auto-Align** traverses between positions completely automatically.
- **Drive-Assist** adjusts the driver's position to be in-line with a target, but keeps them in full control.

- **Autoscoring:** The robot dynamically makes its own decisions on what to do in a match, given a few pieces of information, like its hopper status, the hub's status, or the current time in the match. We use different "strategies" with that information to decide on the next step; it uses auto-align and our shooter to perform these actions. This takes a lot of stress off our driver and optimizes both our active and inactive periods.

DRIVE TRAIN

Holds all electrical components & what moves the entire robot around the field

- R1 Gear Ratio for high-torque delivery
- Rectangle perimeter for larger expansion volume

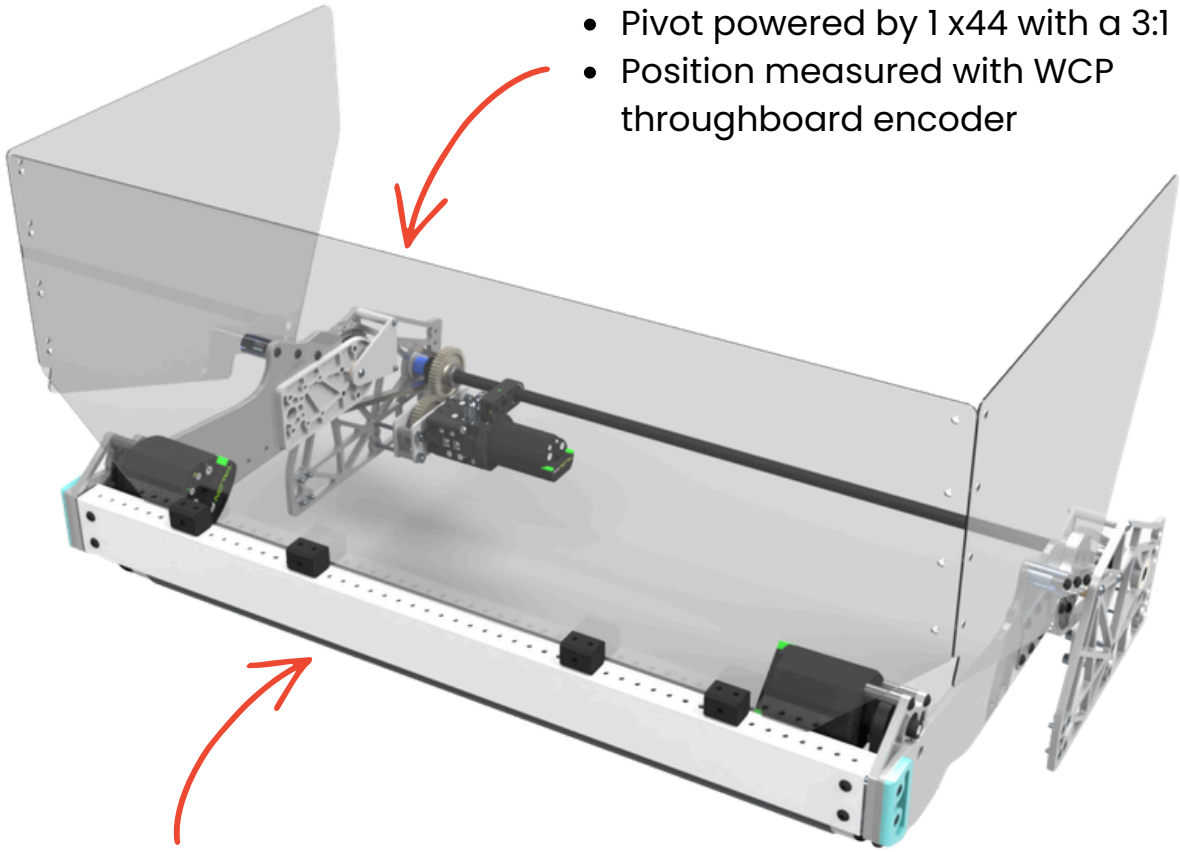


INTAKE

Intake fuel to store in the hopper for our robot to score

- 86.7° pivot rotation to expand hopper
- Hopper extension mounted directly on our dynamic intake plates

- Pivot powered by 1 x44 with a 3:1 ratio
- Position measured with WCP throughboard encoder



Silicone Covered Polycarbonate roller for Intaking

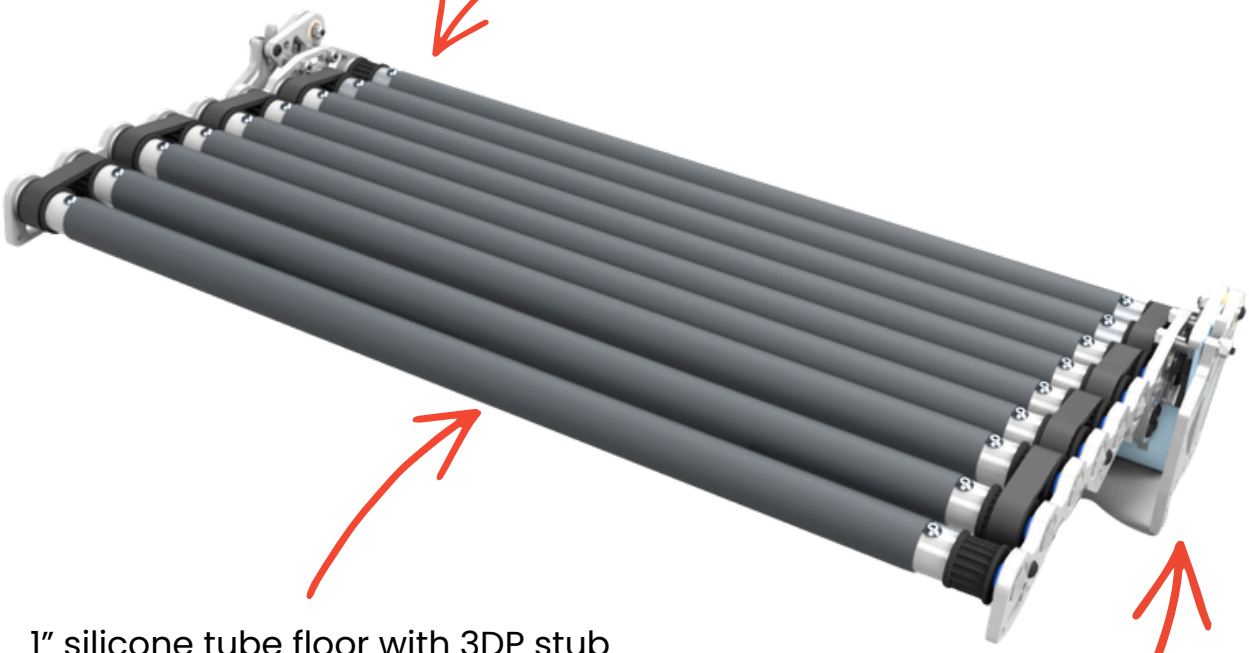
Kicker bar assists the balls to go over the bumper

INDEXER

Transfers the fuel from the intake to the shooter

- Surface speed: 7ft/s
- Locking pivot to allow for battery access

7 polycarbonate and 2 aluminum rollers in surgical tubing for consistent grip and feed



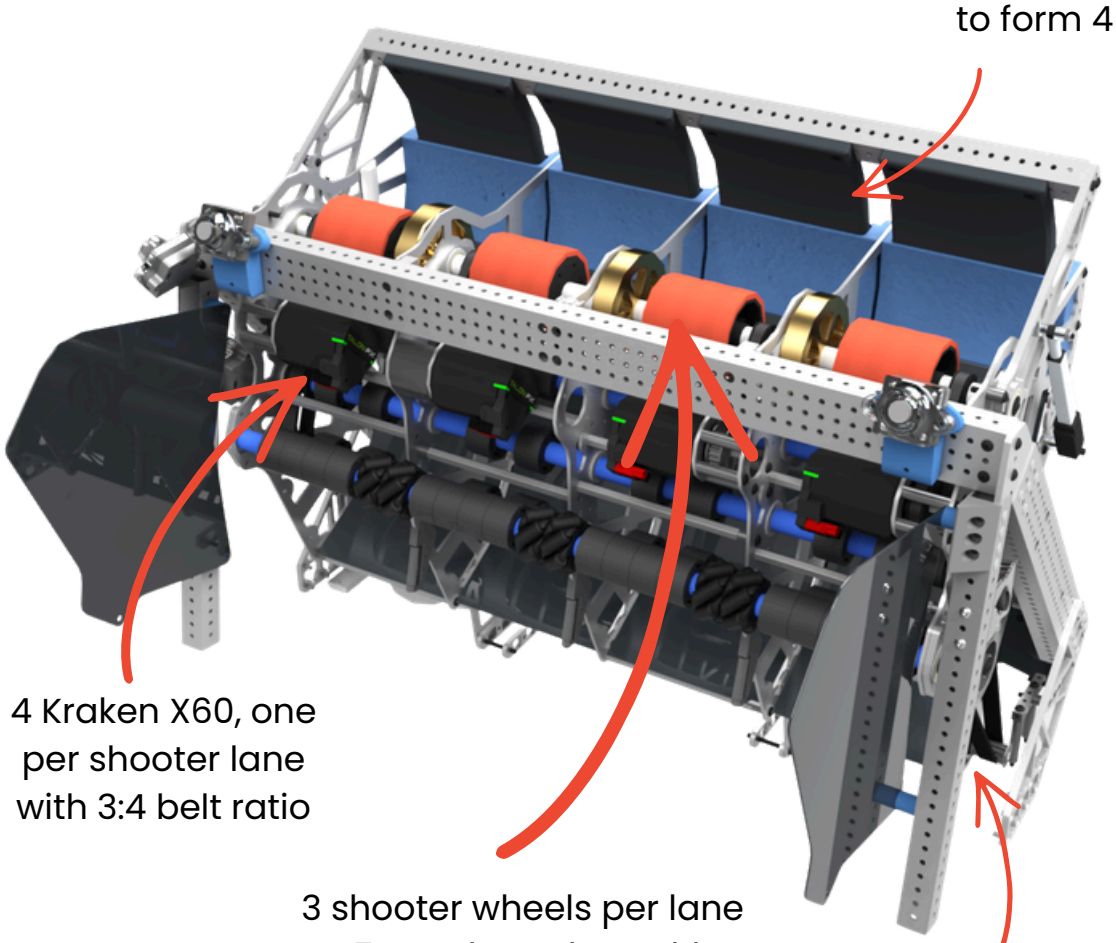
1” silicone tube floor with 3DP stub roller pulleys, 7 polycarbonate, 2 aluminum at the shooter

Powered by 1 Kraken x44 with a 3:1 belt reduction

SHOOTER

Launches balls out of the robot into the hub through a divided drum shooter

- Articulating 3D printed hood
- 30 ft/s exit velocity

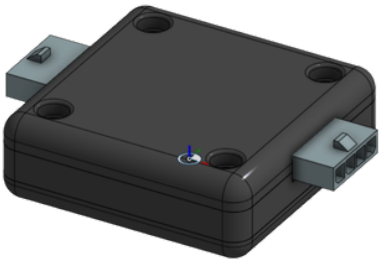


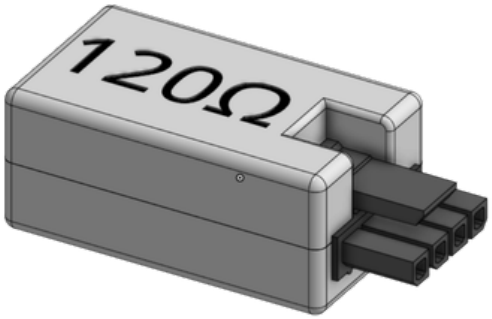
ELECTRICAL



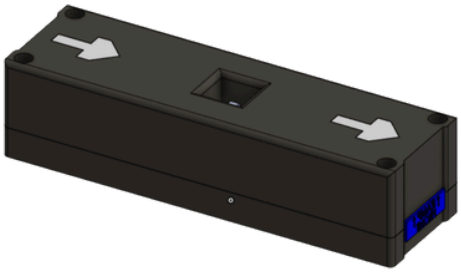
- Custom BEANrange using a CTRE CANrange. Molex microfit connectors for object detection

"Custom Pigeon Case: custom case for the CTRE Pigeon that tracks the robot's orientation.





- Custom Terminating Resistor Case: Keeps the CAN bus reliable and integrates the resistor into the Molex Microfit cable system.



- Custom Cases Using Molex Microfit, allowing the entire electrical system to share a single standard of cable with 4 internal wires.