



BONDS Week Four Newsletter

January 27-February 1 2025

BONDS 5811
314 S Jefferson St, Dayton, OH 45402
bondsfrc@gmail.com

Programming

This season, our goal is to make a temporary electronics board that will sit on the chassis for the beginning of the season. The controls team will be able to work on the vision system while CAD and manufacturing are still working on getting parts made. Parallel work lets us get more done than a linear schedule would in the same amount of time.

The temporary system needs to be able to run the robot without any additional subsystems. This includes:

- 4 swerve-drive modules (which each have two brushless motors and two motor controllers)
- a roboRIO (the computer)
- A breaker to turn the robot on and off
- A radio
- a Power Distribution Panel
- CAN wiring (for system communication)
- a lead-acid battery
- The custom vision system.

Using these pieces, the controls team will be able to work on the vision system without having a fully assembled robot.



Swerve Module Care

Our swerve modules are what allow our robot to actually move. Over 75% of FIRST FRC teams use some version of a swerve drive. It allows the robot to move more freely and more easily allows for precise path planning and odometry for autonomous driving. There are two motors per drive-module - one that rotates the wheel on it's axle, and one that spins the wheel in the direction we want to go. It's an incredible movement upgrade from 6-wheeled tank drive, which was the usual chassis style prior to swerve's takeover.

On Saturday, two trusted students disassembled the swerve modules, swapped out the gearing (for higher torque), and reassembled the modules. Additionally, they cut and attached new tread to the wheels. This is often a thankless job, but it's crucial to our strategy! Drive-system downtime is very costly mid-competition, and doing the work now will ensure that we don't have the stress of a breakdown later



Manufacturing

On Saturday, we started manufacturing the 2"x1" aluminum tubes that build the outside of our chassis. These four bars connect our swerve modules, which sit at the corners. The Omio (CNC) was used to drill the holes in precise positions to ensure the chassis would end up being the proper size. CAD is also being continued in the background to ensure that parts are ready for manufacturing.



Bumpers

The final thing we accomplished on Saturday was starting the bumpers. Bumpers are protective covers for the side of our chassis that are made of $\frac{3}{4}$ " plywood, pool noodles, and fabric with our numbers painted on it (for easy identification by field officials). If your team has no bumpers, they can't compete, so it's critical for us to, ideally, build and finish them while CAD is still working on the subsystems. The wood was selected, measured, and started being cut on the table saw.

Miscellaneous

There are always plenty of things going on at practice! We don't put every detail of practices in these newsletters, but there are some fun things happening in the background that we thought we should mention.

On Mondays this year, we have "cookie Monday", where the coach and a student who loves to bake alternate bringing in team treats. This Monday was the student's turn, and the cookies were superbly on-theme!



Mentors will submit their Dean's List Nominations on Thursday of this week for two junior students. The Dean's List Award, at the international level, is the highest honor and award for an individual student in FIRST. Teams can nominate two sophomore or junior students to be considered at a specific event. Mentors nominate students and write essays on their behalf, and two students are selected at every event to represent local teams. These students then compete at Global Championships and only ten are selected! Stay tuned for next week, when we'll announce who was chosen for this year's team nomination.

The rush to brand the robot and team for the season has begun! We are currently taking James Bond & ocean/water themed suggestions for both the name of the robot and the t-shirt design. Current student name favorites include "James Pond" and "Bubble-oh-seven", but it's still early in the process.

On Valentine's Day, we'll be having our overnight practice! A student favorite year-to-year, practice starts at 6pm on Friday, and ends at about 9am the following day. Someone's family usually volunteers to bring in dinner that day, and we stock up on snacks! The building and manufacturing go late into the night, with stops to snack and play games together. Mentors are sure to stress that if you're too tired, take a nap or go home, and come back better rested. Safety is very important, and no robot progress is worth someone seriously injuring themselves.



CDR

A crucial part of the BONDS process is our design review process. Last week, you heard about our Preliminary Design Review, where students receive initial feedback on their prototypes. This week, on Thursday, we had our final design review, CDR (Critical Design Review). The goal is to present a 70-80% robot in CAD, along with strategy decisions, motor counts, a rough programming plan of what is critical for success, and timelines for every major robot subteam (build, programming, electrical). The two major points that came out of this review were

- 1) Integrating a climber into your design will be critical for your strategy - it is almost impossible to go to playoffs if you can't compete in the end-game.
- 2) More work needs to be done on the electrical components' placements and planning before building begins.

We took about 3 pages of notes overall, including some good test suggestions we wouldn't have thought about (including "Is it possible to run over a coral and get beached? If so, you may need to design around that.") We're very thankful for the engineers who came out to listen and give feedback on our presentation.

We want to give a big thank you to all of our sponsors! Our team can compete because of your support, and none of this would be possible without our sponsor's help. Our team, BONDS, will keep improving and continue learning STEM skills and values this season.

To see our season's progress, please follow us on Instagram, Youtube, Tiktok, and our official website for weekly newsletters.

Facebook: BONDS FRC 5811

Website: bonds5811.com

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