

Hot 67 2017 Climber Summary

When the game was released this year, we created a priority list of all the ways we wanted to score points and climbing was very high up on the list. We decided our goal was to be able to climb in matches quickly and reliably. By allowing us to bring our own rope, FIRST had given us many options and we had to take advantage of this rule by brainstorming what would be a possible, consistent, and sturdy interface between our robot and the rope. We decided to use hook and loop tape, also known as Velcro. By using this versatile set of fabrics, it allows for easy initial contact and startup on climbing.

The next question was how to drive the system. It had to be a high power system as it needed to have a lot of torque and be quick. Our solution was to incorporate our climber system with our drivetrain. Our six CIM (two being mini-CIMs) drivetrain had plenty of torque to offer, and by using this solution, we avoided another set of motors and gearboxes.

After deep consideration, we decided to use a one way clutch. This device includes a sleeve that slides over a steel cylinder, and the sleeve can rotate in one direction around the cylinder with relatively low friction, but when torque is applied in the other direction, it immediately locks and it rotates together as a unit. This means that our drivetrain could be driven in both directions, which is required, but our climber would only spin one direction.

After assembling and testing the climber, the system worked, though not as well as we would have hoped. When we climbed to press the plate, the robot rolled the rope in centered, causing the chassis to be level. This meant that it was harder to press the plate. Also, due to the nature of its geometry, the climber assemble would get caught on the springs for the gear at the airship. While our climber was fairly consistent throughout our first competition, immediately afterwards we modified it to improve it. Instead of using one long cylinder that spans the width of the robot, we partitioned it so that we had two short rollers on either side. Now when we climb, the center of gravity of the robot causes one robot to tilt upwards to hit the scoring plate. This allows us to easily depress the plate and score the points while decreasing the chance of damaging the robot.