**Robot Design Memo**
**Kent Denver Robotics**
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In order to pursue its mission statement of "Learn[ing] about science, technology, engineering, and mathematics through fun, innovative, and fulfilling team-oriented projects in robotics," the Kent Denver Robotics Team has, for the second year in a row, developed a robot designed to compete in the Vex Robotics Competition: Gateway.

## Iterative Design Process

We follow an iterative design process that allows for accurate predictions of the robot's capability, as well as achieving the ultimate goal of VEX to familiarize ourselves with engineering and design process. Using the Vex Gateway Rules as a request for proposal, we are able to document what our robot shall and should do, and then base our designs to accomplish the goals stated on the requirements document.

## We are FAST

- Vector Loop Analysis: Our VLE's show that the robot will be able to lift its arm very fast, making it more efficient at scoring than anyone else's robot

- Chain Drive Analysis: Our chain drive analysis shows our robot can travel at around 2.91 ft/sec. This allows our robot to traverse the entire field in 4 seconds.

## Rock Solid Reliability

- Limiting Current Draw: Our code limits the robot's current draw by reducing the overall amount of current that can be supplied to the motors, as well as limiting their acceleration rate. We also have a clutch task that cuts power to the motors if the robot draws current while stalling. This means our robot is good because it won't stop working during any match.

- Redundant Systems: Our chain drives three separate wheels ensuring that if one skips or comes off track the other two wheels pick up the slack, making us still 100 percent functioning during competition. We also limit current draw mechanically by using torsion bands, reducing the strain on our robot's arm pivot gears, in addition to having redundant code structures that back each other up.

- Stress Analysis: From the stress analysis that we did on both our drive chains and arm gears, with safety factors of 1.5 and 2, it is easy to see that the robot won't have problems with unnecessary breaks and fractures during a round, making us reliable even in extreme situations.

- Reliability Analysis: Our reliability analysis clearly shows that our robot can score on the 30 inch goal even in the case that we have the smallest possible vex parts. That means we always score on the 30-inch goals no matter what

making us the best option compared to other teams because we have the proof. We have mechanically designed our robot for failure.