Lucas: Welcome to Team 254 VEX Tech Talk. I'm Lucas

Dorian: and I'm Dorian.

Lucas: Today we are going to be discussing one of the most fundamental aspects of the robot, the drive base.

Dorian: First, while designing the drive base, its important to consider the amount of space your intake will require. What these means is that if you build your drive base too wide, the intake you intend to build might not be able to fit in between the drive; and thus, it will not be able to fit in that 18 inch cube. It doesn't matter if you are using a conveyor or a claw, you're going to need to account for the space it will take up in between your drive.

Lucas: Because if you don't take this into account, you may end up having to rebuild your whole robot. Now once you account for the initial size constraint, the next thing to consider is weight. Weight is critical because if your robot is too heavy and doesn't have enough power, it will fail during a match. We always recommend 2.91 to 3.5 feet per second for a robot which weighs in between 9 - 14 pounds when using four VEX high strength 393 motors on the drive.

Dorian: of course, what motors you use is entirely up to you, but we have found that the VEX 393 motors tend to perform better on the drive base because they have a much larger tolerance before their thermal fuse fails.

Lucas: and Here's a quick tip. If a thermal fuse on one motor fails, that motor will loose between 5-10% of its power which may cause other motors to fail. Or it could cause the robot to curve in one direction or another.

Dorian: So in order to avoid a lot of these frustrating scenarios, make sure you DO NOT under-power your robot, or in the heat of competition you may end up very frustrated.

Lucas: To start out on specifics, where going to talk about wheels. Let’s examine the different types of wheels available in the VEX robotics kit. First up, we have the omni-direction wheel. Omni wheels are

excellent for aiding in turning because they can move in any direction. Hence, there will be no lateral friction when turning.

Dorian: If you don't need to resist pushing, you might consider using all omni's the drive base; however, we recommend using at least two non-omni, or friction wheels in any interactive game. This way you won't be pushed out of the way when trying to score. Also, make sure your powered wheels have weight on them. Take a look at this example: Notice how the weight is right over the powered wheels. If the weight is not above your powered wheels, there will be a tendency for wheel-slip.

Lucas: now let's shift our focus to Gears & Chain. REMEMBER! Every single gear or chain ratio used is inefficiency. Part of the 393's value, is its ability to have an adjustable internal gear ratio. This internal gear ratio is MUCH better than any external gear ration.

Dorian: For example, if you want to have your robot move at about 3.5 feet per second, have your 393 motors spin freely at 160RPM, and then direct drive a 5" traction wheel as seen in the picture. This is a much more efficient than the example seen here: …which is demonstrates a motor spinning at 100RPM powering a 60Tooth gear and driving a 36 Tooth gear. These two approaches achieve very similar speeds, but the first option is much more efficient.

Lucas: Now it's time for our final segment: Do's and Don'ts.

Don't cantilever a drive, vex axles just cannot take it and its far too susceptible to in match damage.

Take a look at this example:……notice how the axle is just hanging off the drive base. If there is any sort of weight on that axle, it will bend and cause an incredible amount of friction on the bearing which only makes your motors work a lot harder than necessary.

Dorian: Also pay special attention when mounting your bearings. Test the friction between the bearing and the axles by doing the following:

Lucas: If you hear skipping or see wheel slipping, it's a problem that must be addressed. make sure you don't cantilever gears or chain as this is a major cause for skipping.

And finally, minimize the "slop" in your drive base and put your shaft encoders as close to the motor as possible for accuracy. "Slop" refers to a wheel , sprocket, or gear which can turn a minute amount about an axle without actually causing the axle itself to turn. A lot of slop can be a nightmare when trying to program precise autonomous routines. To minimize the slop in your drive, bar lock your low strength gears and any sprockets you use. Also, utilize bar locks to help eliminate slop in your wheels. A great example of this can be seen. Here