

# Polycarbonate: The Clear Choice

During the 2014-2015 VEX season, we created a polycarbonate drivetrain. This new innovative design allows us to place holes in various areas enabling the ability to create mechanisms such as; a center drop, a pneumatic transmission (Dog Shifter), a manual transmission , and a four, six, or eight wheel drive. All of these types of drive can fit inside two inches of spacing.

A center drop gives us the capability of having all traction wheels on the drive. One problem with having all traction wheels is that it prevents robots from turning with ease, which is why Omni-Directional Wheels would be used instead. A center drop is a customized drivetrain where the middle wheel on the drive is lower than the other two. This enables turning with traction wheels easier since the center wheels are lower than the others. This is applicable with six and eight wheel drives.

A transmission is a manipulator that adjusts the power/speeds of a drive. The polycarbonate drive is convertible to either a pneumatic or manual dog shifter transmission. This drive is customizable to have the perfect spacing for a transmission by drilling precise holes in areas needed. For example, the spacing with a C-Channel does not work because the given holes aren't spaced to where we would like them to be, being a 1/16" off. Compared to the polycarbonate drive where space can be adjusted by drilling customized holes.

The more wheels on the drive, the more traction received. For some games like Toss-Up and Sack-Attack, traction would be very useful. The polycarbonate drive allows the capability to have a various amount of wheels in a position that's most efficient, the polycarbonate drive

enables the ability to do this because its capable of having holes drilled in specific places so that each wheel will have a precise spacing.

The width of the polycarbonate sheet is 1/16". which allows for many important features. When used as a drivetrain. It easily fits wheels and gears/chain inside a tight area creating a thin drive. A compact drive decreases the chances of axles bending and gives more space for different mechanisms to move.

We use Computer Aided Design (CAD) to create basic parts, which are then used to create the whole robot virtually. For Skyrise, this years game we wanted an all traction drive. After discussing different approaches, we decided that having a polycarbonate drive base would be best because we could use our water-jet to cut the center drop holes. Before we cut on the water-jet we opened up Autodesk Inventor Pro to create a diagram so that we knew the exact dimensions before we cut anything. After creating the CAD model we input the files into the water jet and the parts came out exactly how they were designed. After putting the drive together we ran a test and it worked exactly as planned. Overall, this new drive design will not only benefit our team but others as well.