Team 2323Z Aluminati
Weber School District, Utah
VEX Planetary Transmission

The new VEX Planetary Transmission (PT) is designed for simplicity and elegance as it converts limited motor output into variable amounts of speed or torque. There have been multiple designs using regular VEX EDR parts, but those designs are extremely complex and bulky. The PT is very simple to install, requiring only two bolts to mount it on any VEX EDR robot, fitting easily with its reduced size. This is a “bolt and go” transmission.

The two required motors are attached through an easy to remove panel located on the input side of the PT. On this panel, there are multiple mounts for motors to fit into your robot chassis. The PT mounts securely onto your robot chassis with two tabs on either ends that will work with the standard VEX size screws. These mounting holes are also positioned to the VEX standard of ½” increments for easy mounting of the PT. To attach the output of the PT to your robot’s drivetrain, simply insert a shaft into the PT’s output port. If you wish to output to a high-strength shaft, just replace the output port with the included high-strength shaft converter. Controlling the output ratio is very simple. If the motors are spinning in opposing directions, the output ratio is 1:5.42, giving it high speed. If the motors are spinning in the same direction, then the output ratio is 1:1.25, which gives more torque than the other setting.

In order to design the Planetary Transmission, Autodesk Inventor 2014 was used. Many of the parts were created from the ground up. The process for each part started with a 2D sketch followed by extrusions to create a basic, workable shape. After that, other processes were used to refine the parts into their final design. Some parts, such as chain, sprockets, and gears, were adapted from existing VEX EDR parts. These parts were altered in order to reduce the overall size of the PT. The pieces were constrained together using a mixture of the different options available in Inventor. Sub-assemblies were created to aid in the assembly of the final product. The interior components were then assembled and placed so that an exterior shell could be created to wrap snugly around the components, but leave enough room to freely move around. To create the chain, a pattern of chain linkages were used that followed a path around the sprockets. Materials were then chosen for the parts based on the purpose. Structural components, such as gears, sprockets, and chain, are manufactured out of steel, while bearings and spacers are manufactured out of plastic. An exploded view was then created for each of the sub-assemblies and the full assembly. Inventor was instrumental in streamlining the design process, and permitted multiple iterations in a compressed time period. See attached documents to see more of the design process that was followed.