The TRE ATB (Automatic Torque Biasing, also known as "Torsen"-type) differentials are geared units consisting of proprietary internal components made to our specifications by Quaife integrated into our chain-drive specific housings and drive interfaces. This type of differential has been the choice of drivers across many forms of motorsports for driveability and effectiveness of distributing torque to the wheels. One common misconception is that the ATB type differentials are not adjustable, when in fact, there are multiple ways to tune the differential to suit the desired driving characteristics of the vehicle.

The ATB differential develops its torque biasing behavior from friction between all the individual interfaces of the internal components shown in the figure below. The normal forces for this friction are created due to two different sources, the preload from the Belleville washers between the two sun gears and the gear thrust and separating loads acting on both the cylindrical outer diameters of the planets as well as the end faces of the gears. The preload is a static component and adjustable with shims or spring pack changes while the gear loads are a varying component based on the torque differential between the two axles.

In addition to adjusting the preload, the friction component behavior is adjustable with the use of different fluids. These can be any number of options of motor oils, gear oils, automatic transmission fluids, friction modifier additives, and advanced non-Newtonian shear thickening fluids. Different vehicles, setups, and drivers will need and want different characteristics and testing different fluids is the best way to determine a good fit for the entire vehicle/driver/differential/track system. With the lower viscosity oils, the friction is the driving behavior, while moving up in thickness/viscosity will add a bit more viscous or fluid traction properties to the differential's internal system. Ultimately, for very tight tracks or vehicles that tend to get lightly-loaded inside rear wheels during cornering the transition to shear-thickening fluids often improves performance and driver feel. This is because these fluids modify the differential's dynamic behavior through viscous effects. For example, during periods of high shear rate (from differential speed and/or load) these fluids increase the force transfer between the differential components which increases the "locking" behavior of the differential.