

## Differentials

A mechanical machine which could transmit rotation and torque via three shafts is called a differential. Occasionally but not all the time the differential would employ gears and would function in two ways: in automobiles, it provides two outputs and receives one input. The other way a differential operates is to put together two inputs to produce an output that is the sum, average or difference of the inputs. In wheeled vehicles, the differential enables all tires to rotate at different speeds while supplying equal torque to all of them.

The differential is designed to power the wheels with equivalent torque while also allowing them to rotate at different speeds. When traveling around corners, the wheels of the automobiles will rotate at various speeds. Some vehicles like karts work without using a differential and use an axle as a substitute. Whenever these vehicles are turning corners, both driving wheels are forced to rotate at the identical speed, usually on a common axle that is driven by a simple chain-drive mechanism. The inner wheel must travel a shorter distance as opposed to the outer wheel while cornering. Without using a differential, the effect is the outer wheel dragging and or the inner wheel spinning. This puts strain on drive train, resulting in unpredictable handling, difficult driving and damage to the tires and the roads.

The amount of traction needed to move any vehicle would depend upon the load at that moment. Other contributing factors include gradient of the road, drag and momentum. Amongst the less desirable side effects of a conventional differential is that it could limit grip under less than ideal conditions.

The torque provided to each and every wheel is a result of the drive axles, transmission and engine applying a twisting force against the resistance of the traction at that specific wheel. The drive train could typically provide as much torque as required unless the load is exceptionally high. The limiting element is usually the traction under each and every wheel. Traction can be defined as the amount of torque which can be generated between the road surface and the tire, before the wheel begins to slip. The automobile would be propelled in the intended direction if the torque used to the drive wheels does not go beyond the limit of traction. If the torque used to every wheel does go over the traction threshold then the wheels will spin continuously.