

## Differentials

A mechanical machine capable of transmitting torque and rotation through three shafts is referred to as a differential. Every so often but not at all times the differential would utilize gears and would operate in two ways: in vehicles, it receives one input and provides two outputs. The other way a differential works is to combine two inputs to produce an output that is the sum, average or difference of the inputs. In wheeled vehicles, the differential allows each of the tires to be able to rotate at different speeds while supplying equal torque to all of them.

The differential is intended to drive a set of wheels with equivalent torque while allowing them to rotate at various speeds. While driving around corners, an automobile's wheels rotate at various speeds. Several vehicles like for example karts function without utilizing a differential and make use of an axle as an alternative. If these vehicles are turning corners, both driving wheels are forced to spin at the same speed, usually on a common axle which is driven by a simple chain-drive apparatus. The inner wheel has to travel a shorter distance as opposed to the outer wheel while cornering. Without utilizing a differential, the result 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 considered necessary to be able to move the vehicle at whichever given moment is dependent on the load at that moment. How much friction or drag there is, the vehicle's momentum, the gradient of the road and how heavy the vehicle is are all contributing elements. One of the less desirable side effects of a traditional differential is that it can reduce traction under less than perfect circumstances.

The end result of torque being supplied to every wheel comes from the transmission, drive axles and engine making use of force against the resistance of that grip on a wheel. Usually, the drive train will provide as much torque as needed unless the load is very high. The limiting factor is commonly the traction under each wheel. Traction can be interpreted as the amount of torque which could be generated between the road exterior and the tire, before the wheel starts to slip. The vehicle would be propelled in the intended direction if the torque applied to the drive wheels does not exceed the threshold of traction. If the torque applied to every wheel does go beyond the traction threshold then the wheels would spin incessantly.