

What Does a Differential Do?

There is no need of an *auto differential* if you can [drive the car](#) on the road without making a turn. But, that is virtually impossible. You have to turn the car around corners and this is where the differential comes into play.

The wheels of a car rotate at various speeds when turning. The travel distance of the inside wheelset is shorter than the outside wheelset at the time of making a turn. It means that the inside wheelset travels slower and the car is unlikely to run in that condition. The differential is necessary to balance out that speed differences.

This is not a problem on the vehicles with non-driven wheels because they spin independently of each other as they are not linked to each other. But, a car differential plays a vital role when it is driven wheels. These are connected together and both are under the control of a single engine and transmission. Without a differential, these would have been required to be connected together to rotate at the same speed and cover the same distance, which will make turning the car extremely difficult.

How a Differential Works – An Open Differential

An open differential is the simplest of all the available differential types. When a vehicle is running straight on the road, the input pinion in the differential turns the ring gear and cage but none of the pinions within the cage spin. The side gears stay attached to the cage during this time.

When the car starts driving around a corner, the wheels start rolling at different speeds. The cage's pinions begin rolling at this time, allowing the wheels to keep rotating at two different speeds. Suppose, If the ultimate drive ratio is 5, the teeth of the ring gear will be 5 times than the input pinion because of the unique mechanism of the differential. As a result, the car can easily make the turn without forcing the wheels to maintain the same speed.

Interact with the attach CAD file to further understand it.