



Passenger Car Drive Axle Technology

An Online Continuing Education Course for Engineers

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Introduction

A drive axle is an integral assembly containing mechanical components that are used to deliver power from the engine to the driving wheels of an automotive vehicle. This course will deal with the drive axles that are used in the rear of front engine vehicles and are also in the front of four-wheel drive front engine vehicles. (Drive axles are also used in front engine, front drive vehicles where they are combined with the transmission in what is called the “transaxle”.)

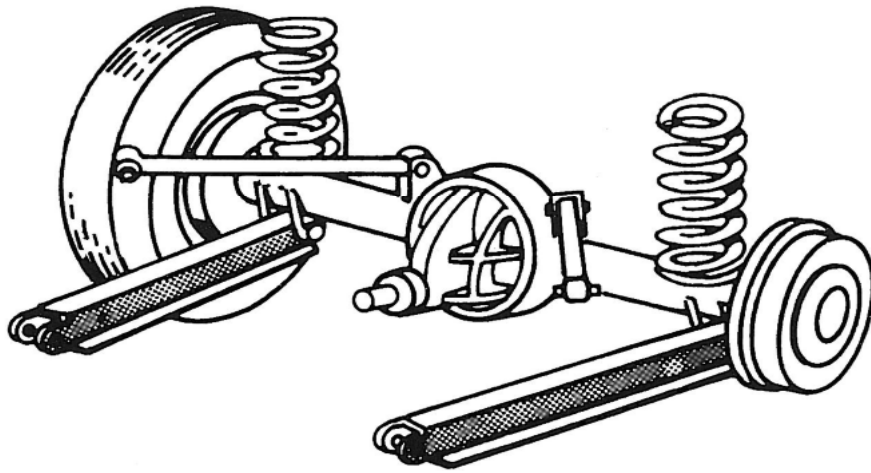
It can be seen on the top sketch of Figure 1 that the rear drive axle is mounted on trailing suspension arms and serves as a base for mounting the springs and shock absorbers. The track bar shown connects to the frame and serves as lateral support for the drive axle/rear suspension system. The lower sketch has a front drive axle with linkage attached to the left hand wheel mounting flange and a “tie rod” connecting both wheels to provide for vehicle steering.

The power transmitting components in drive axles are gears. Figure 2 shows four kinds of commonly used gears. The basic form is the “spur” gear. It has straight teeth around the periphery that engage with another spur gear on a parallel shaft. A version of a spur gear is called the “helical” gear. A helical gear has teeth like spur gears except they are curved. Helical gears deliver more power and run more quietly than spur gears but are less efficient. The third kind of gear is called a “bevel” gear. Bevel gears have teeth like spur gears except they are tapered. Bevel gear axes are not parallel like spur gears but mount at an angle such as 90° as shown on Figure 2. An adaption of the bevel gear is the “spiral bevel gear”. It has curved teeth similar to what helical gears are to spur gears.

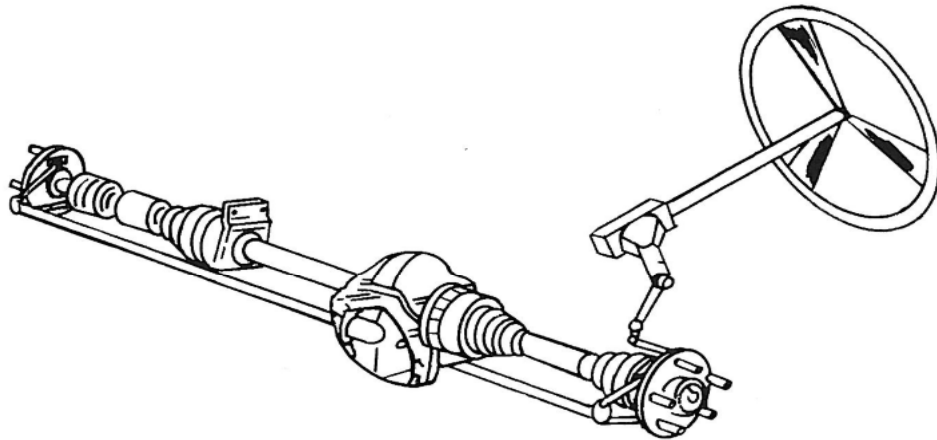
Figure 3 has sketches of a version of a spiral bevel type gear with the pinion (small gear) axis either below or above the ring (large gear) axis. When the axes of the two gears are not on the same vertical plane, spiral bevel gears are called “hypoid” gears. Straight bevel gears, spiral bevel gears, and hypoid gears are used in automotive drive axles as explained later in this course.

Figure 1

Types of Drive Axles



Rear Drive Axle



Front (Steering) Drive Axle

Figure 2
Types of Gears

