



What is a DC Motor?

A direct current (DC) motor is a fairly simple electric motor that uses electricity and a magnetic field to produce torque, which turns the motor. At its most simple, a DC motor requires two magnets of opposite polarity and an electric coil, which acts as an electromagnet. The repellent and attractive electromagnetic forces of the magnets provide the torque that causes the DC motor to turn.

If you've ever played with magnets, you know that they are polarized, with a positive and a negative side. The attraction between opposite poles and the repulsion of similar poles can easily be felt, even with relatively weak magnets. A DC motor uses these properties to convert electricity into motion. As the magnets within the DC motor attract and repel one another, the motor turns.

A DC motor requires at least one electromagnet. This electromagnet switches the current flow as the motor turns, changing its polarity to keep the motor running. The other magnet or magnets can either be permanent magnets or other electromagnets. Often, the electromagnet is located in the center of the motor and turns within the permanent magnets, but this arrangement is not necessary.

To imagine a simple DC motor, think of a wheel divided into two halves between two magnets. The wheel of the DC motor in this example is the electromagnet. The two outer magnets are permanent, one positive and one negative. For this example, let us assume that the left magnet is negatively charged and the right magnet is positively charged.

Electrical current is supplied to the coils of wire on the wheel within the DC motor. This electrical current causes a magnetic force. To make the DC motor turn, the wheel must have be negatively charged on the side with the negative permanent magnet and positively charged on the side with the permanent positive magnet. Because like charges repel and opposite charges attract, the wheel will turn so that its negative side rolls around to the right, where the positive permanent magnet is, and the wheel's positive side will roll to the left, where the negative permanent magnet is. The magnetic force causes the wheel to turn, and this motion can be used to do work.

When the sides of the wheel reach the place of strongest attraction, the electric current is switched, making the wheel change polarity. The side that was positive becomes negative, and the side that was negative becomes positive. The magnetic forces are out of alignment again, and the wheel keeps rotating. As the DC motor spins, it continually changes the flow of electricity to the inner wheel, so the magnetic forces continue to cause the wheel to rotate.

DC motors are used for a variety of purposes, including electric razors, electric car windows, and remote control cars. The simple design and reliability of a DC motor makes it a good choice for many different uses, as well as a fascinating way to study the effects of magnetic fields.