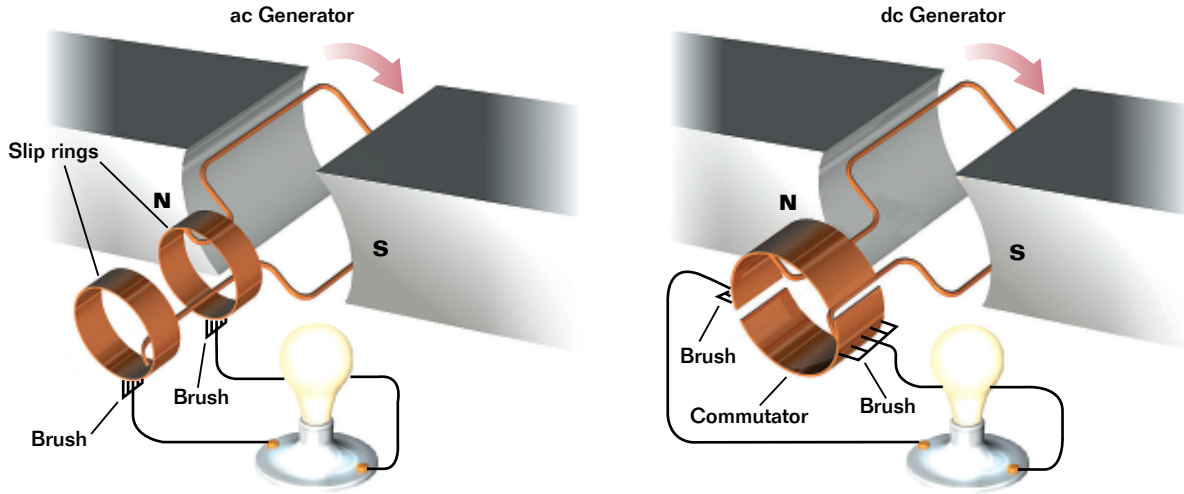

Figure 10
A simple dc generator (shown on the right) employs the same design as an ac generator (shown on the left). A split slip ring converts alternating current to direct current.

Alternating current can be converted to direct current

The conducting loop in an ac generator must be free to rotate through the magnetic field. Yet it must also be part of an electric circuit at all times. To accomplish this, the ends of the loop are connected to conducting rings, called *slip rings,* that rotate with the loop. Connections to the external circuit are made by stationary graphite strips, called *brushes,* that make continuous contact with the slip rings. Because the current changes direction in the loop, the output current through the brushes alternates direction as well.

By varying this arrangement slightly, an ac generator can be converted to a dc generator. Note in **Figure 10** that the components of a dc generator are essentially the same as those of the ac generator except that the contacts to the rotating loop are made by a single split slip ring, called a *commutator.*

At the point in the loop's rotation when the current has dropped to zero and is about to change direction, each half of the commutator comes into contact with the brush that was previously in contact with the other half of the commutator. The reversed current in the loop changes directions again so that the output current has the same direction as it originally had, although it still changes from a maximum value to zero. A plot of this pulsating direct current is shown in **Figure 11.**

A steady direct current can be produced by using many loops and commutators distributed around the rotation axis of the dc generator. This generator uses slip rings to continually switch the output of the generator to the commutator that is producing its maximum emf. This switching produces an output that has a slight ripple but is nearly constant.

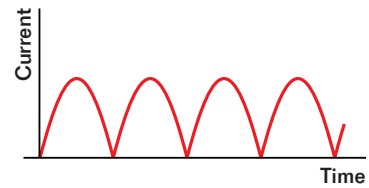

Figure 11
The output current for a dc generator with a single loop is a sine wave with the negative parts of the curve made positive.