Alternators

An alternator is actually a machine that changes mechanical energy into electric energy. It does this in the form of an electric current. In principal, an AC electric generator could also be called an alternator. The word normally refers to a small, rotating machine driven by automotive and different internal combustion engines. Alternators that are placed in power stations and are powered by steam turbines are known as turbo-alternators. The majority of these devices make use of a rotating magnetic field but every so often linear alternators are likewise used.

A current is produced inside the conductor whenever the magnetic field around the conductor changes. Generally the rotor, a rotating magnet, spins within a set of stationary conductors wound in coils. The coils are situated on an iron core called the stator. If the field cuts across the conductors, an induced electromagnetic field likewise called EMF is generated as the mechanical input causes the rotor to turn. This rotating magnetic field generates an AC voltage in the stator windings. Typically, there are 3 sets of stator windings. These physically offset so that the rotating magnetic field induces 3 phase currents, displaced by one-third of a period with respect to each other.

In a "brushless" alternator, the rotor magnetic field can be caused by induction of a lasting magnet or by a rotor winding energized with direct current through slip rings and brushes. Brushless AC generators are usually located in bigger machines compared to those used in automotive applications. A rotor magnetic field could be produced by a stationary field winding with moving poles in the rotor. Automotive alternators normally use a rotor winding which allows control of the voltage generated by the alternator. It does this by changing the current in the rotor field winding. Permanent magnet devices avoid the loss because of the magnetizing current within the rotor. These devices are limited in size because of the price of the magnet material. As the permanent magnet field is constant, the terminal voltage varies directly with the generator speed.