

Alternators

A device used to transform mechanical energy into electrical energy is actually called an alternator. It can perform this function in the form of an electric current. An AC electrical generator could basically also be termed an alternator. Then again, the word is typically utilized to refer to a rotating, small device powered by internal combustion engines. Alternators that are situated in power stations and are powered by steam turbines are actually referred to as turbo-alternators. The majority of these devices make use of a rotating magnetic field but at times linear alternators are also utilized.

A current is generated within the conductor if the magnetic field all-around the conductor changes. Normally the rotor, a rotating magnet, spins within a set of stationary conductors wound in coils. The coils are located on an iron core referred to as the stator. When the field cuts across the conductors, an induced electromagnetic field or EMF is generated as the mechanical input causes the rotor to revolve. This rotating magnetic field produces an AC voltage in the stator windings. Normally, there are 3 sets of stator windings. These physically offset so that the rotating magnetic field produces 3 phase currents, displaced by one-third of a period with respect to each other.

"Brushless" alternators - these make use of slip rings and brushes together with a rotor winding or a permanent magnet so as to induce a magnetic field of current. Brushless AC generators are usually found in bigger devices like for example industrial sized lifting equipment. A rotor magnetic field can be produced by a stationary field winding with moving poles in the rotor. Automotive alternators normally utilize a rotor winding which allows control of the voltage produced by the alternator. This is done by changing the current in the rotor field winding. Permanent magnet machines avoid the loss because of the magnetizing current within the rotor. These devices are restricted in size due to the cost of the magnet material. As the permanent magnet field is constant, the terminal voltage varies directly with the generator speed.