

Alternators

An alternator is actually a machine that transforms mechanical energy into electric energy. It does this in the form of an electrical current. In essence, an AC electric generator could likewise be labeled an alternator. The word normally refers to a rotating, small device driven by automotive and other internal combustion engines. Alternators which are situated in power stations and are powered by steam turbines are actually known as turbo-alternators. The majority of these machines utilize a rotating magnetic field but at times linear alternators are also utilized.

If the magnetic field all-around a conductor changes, a current is generated inside the conductor and this is actually the way alternators produce their electricity. Normally the rotor, which is actually a rotating magnet, turns within a stationary set of conductors wound in coils situated on an iron core which is known as the stator. If the field cuts across the conductors, an induced electromagnetic field likewise called EMF is produced as the mechanical input causes the rotor to revolve. This rotating magnetic field produces an AC voltage in the stator windings. Usually, 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 use brushes and slip rings with a rotor winding or a permanent magnet so as to induce a magnetic field of current. Brushless AC generators are usually located in bigger devices such as industrial sized lifting equipment. A rotor magnetic field may be induced by a stationary field winding with moving poles in the rotor. Automotive alternators often make use of a rotor winding which allows control of the voltage generated 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 inside the rotor. These devices are restricted in size because of the price of the magnet material. The terminal voltage varies with the speed of the generator as the permanent magnet field is constant.