About myself

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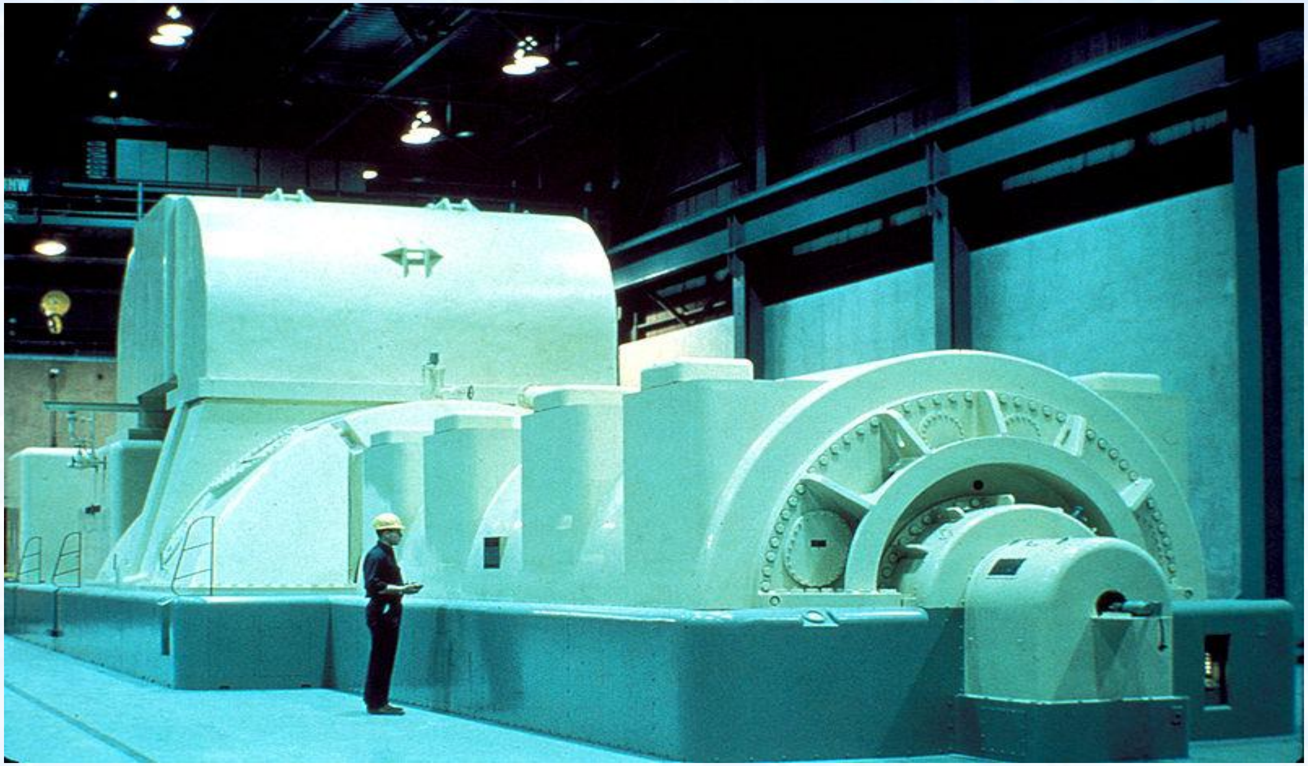
ELECTRICAL GENERATOR

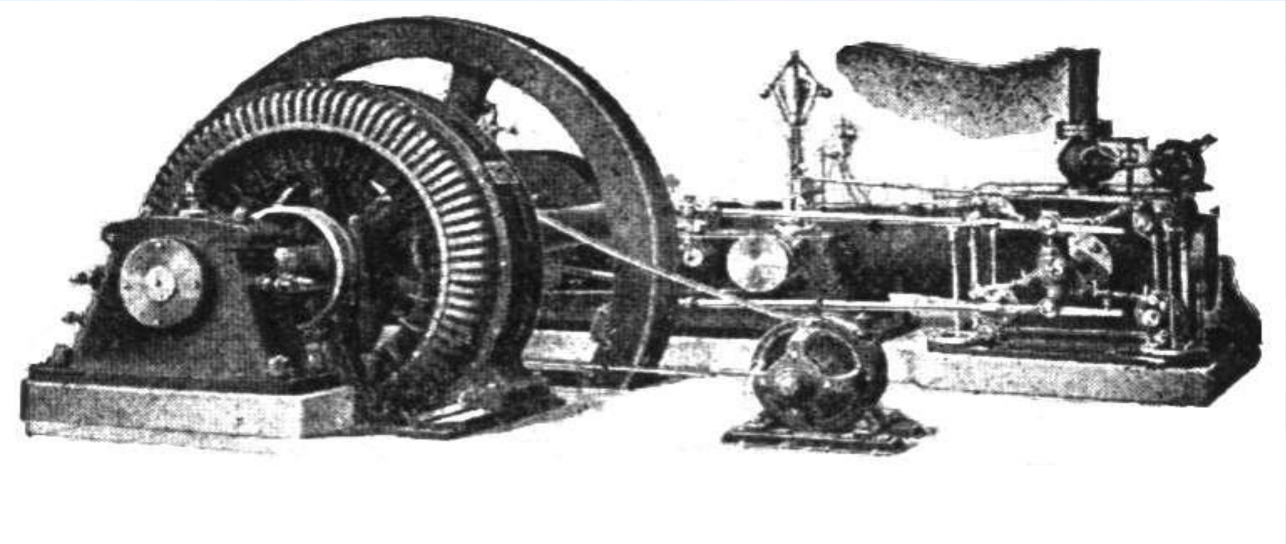
An electrical generator is a device that converts kinetic energy to electrical one, generally using electromagnetic induction.



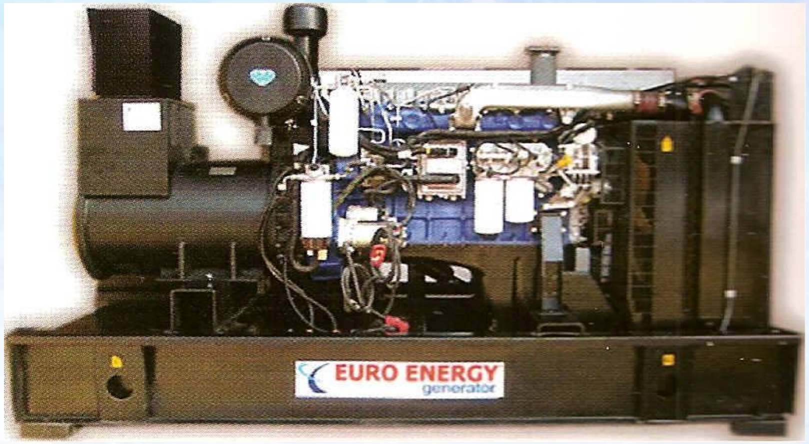
The reverse conversion of electrical energy into mechanical energy is done by a motor. Motors and generators have many similarities in its constructions .

The source of mechanical energy may be a reciprocating or turbine steam engine, water falling through a turbine or waterwheel, an internal combustion engine, a wind turbine, a hand crank, or any other source of mechanical energy.

DYNAMO

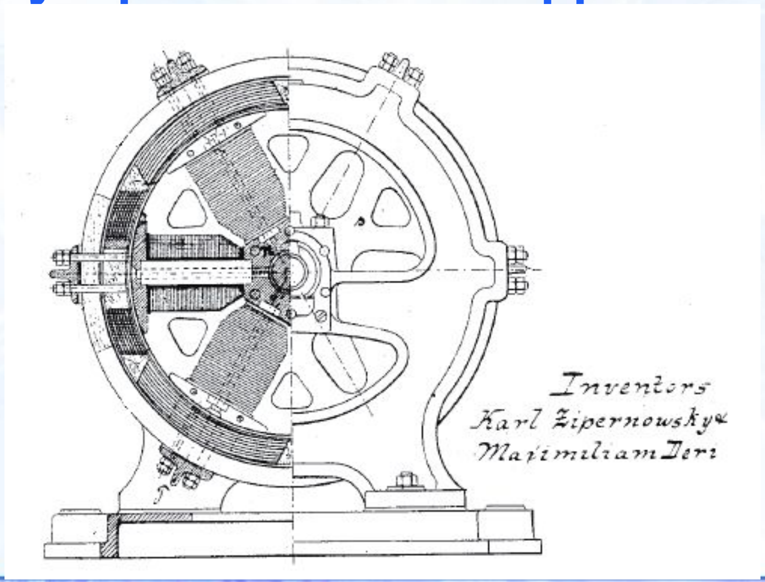


The Dynamo was the first electrical generator capable of delivering power for industry. The dynamo uses electromagnetic principles to convert mechanical rotation into a pulsing direct electric current through the use of a commutator. A dynamo machine consists of a stationary structure, which provides a constant magnetic field, and a set of rotating windings which turn within that field.

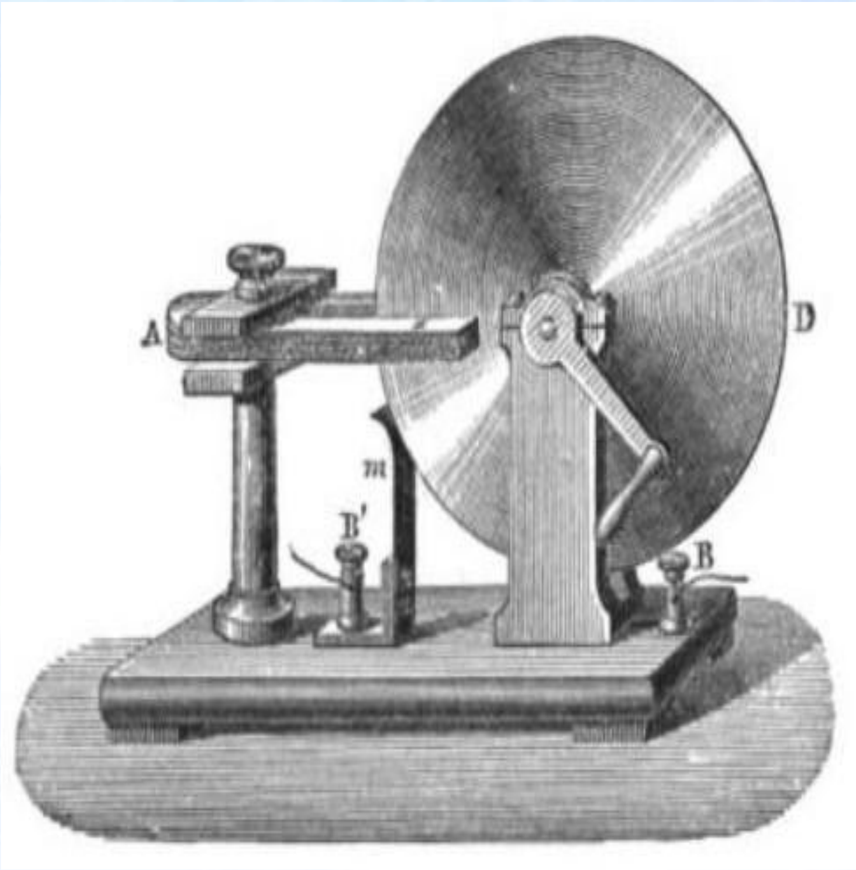


On small machines the constant magnetic field may be provided by one or more permanent magnets; larger machines have the constant magnetic field provided by one or more electromagnets, which are usually called field coils.

The first dynamo based on Faraday's principles was built in 1832 by Hippolyte Pixii, a French instrument maker. It used a permanent magnet which was rotated by a crank. The spinning magnet was positioned so that its north and south poles passed by a piece of iron wrapped with

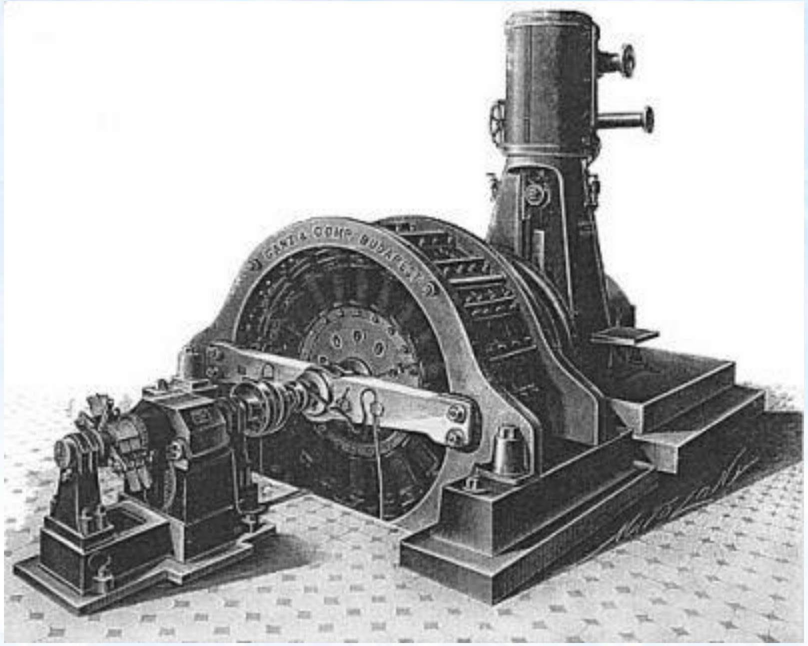


Pixii found that the spinning magnet produced a pulse of current in the wire each time a pole passed the coil. Furthermore, the north and south poles of the magnet induced currents in opposite directions. By adding a commutator, Pixii was able to convert the alternating current to direct current.



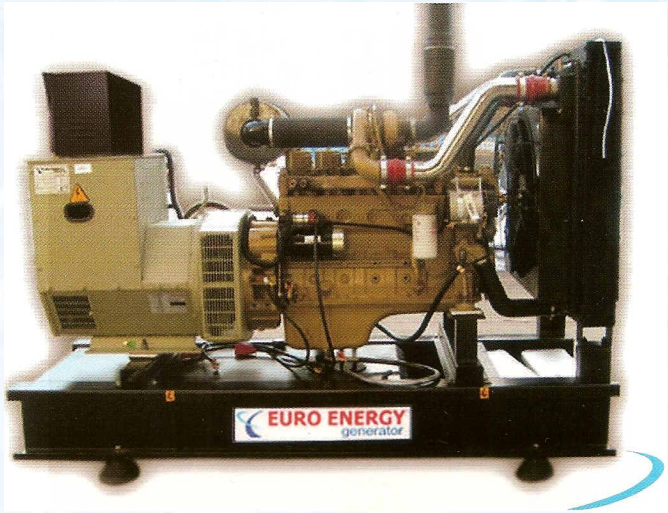
Unlike the Faraday disc, many turns of wire connected in series can be used in the moving windings of a dynamo. This allows the terminal voltage of the machine to be higher than a disc can produce, so that electrical energy can be delivered at a convenient voltage.

The relationship between mechanical rotation and electric current in a dynamo is reversible; the principles of the electric motor were discovered when it was found that one dynamo could cause a second interconnected dynamo to rotate if current was fed through it.



Other Rotating Electromagnetic Generators

Without a commutator, the dynamo is an example of an alternator, which is a synchronous singly-fed generator. With an electromechanical commutator, the dynamo is a classical direct current (DC) generator. The alternator must always operate at a constant speed that is precisely synchronized to the electrical frequency of the power grid for non-destructive operation. The DC generator can operate at any speed within mechanical limits but always outputs a direct current waveform.



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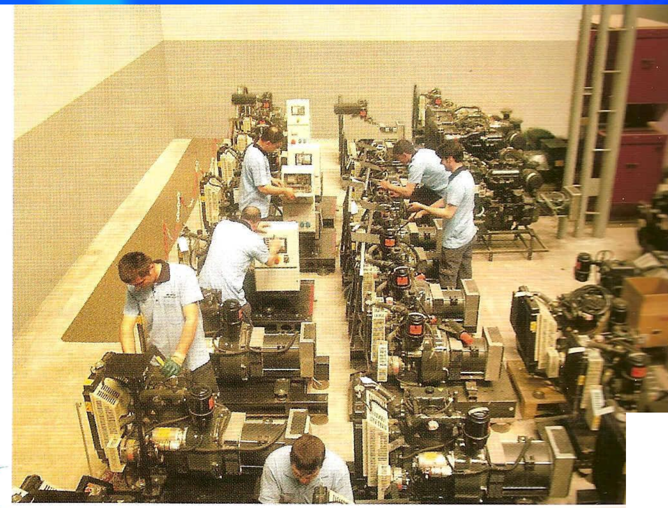
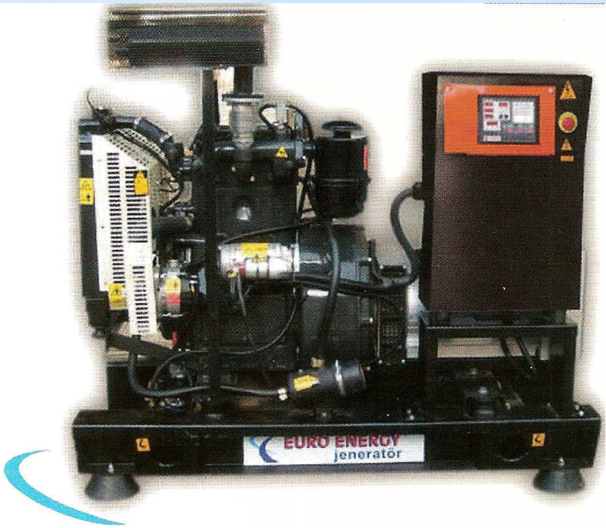
DiGen

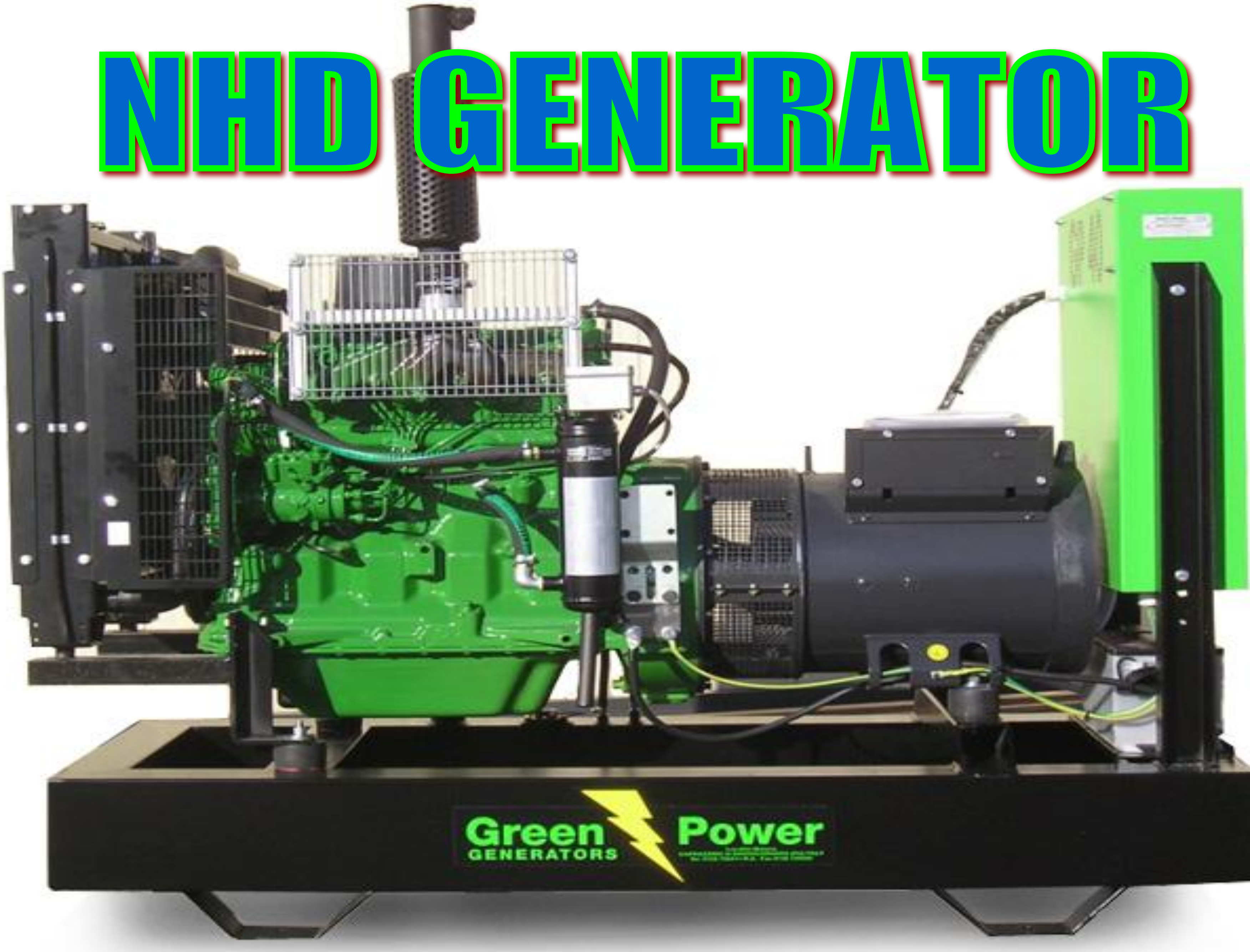


Other types of generators, such as the asynchronous or induction singly-fed generator, the doubly-fed generator, or the brushless wound-rotor doubly-fed generator, do not incorporate permanent magnets or field windings that establish a constant magnetic field, and as a result, are seeing success in variable speed constant frequency applications, such as wind turbines or other renewable energy techologies.

The full output performance of any generator can be optimized with electronic control but only the doubly-fed generators or the brushless wound-rotor doubly-fed generator incorporate electronic control with power ratings that are substantially less than the power output of the generator under control, which by itself offer cost, reliability and efficiency benefits

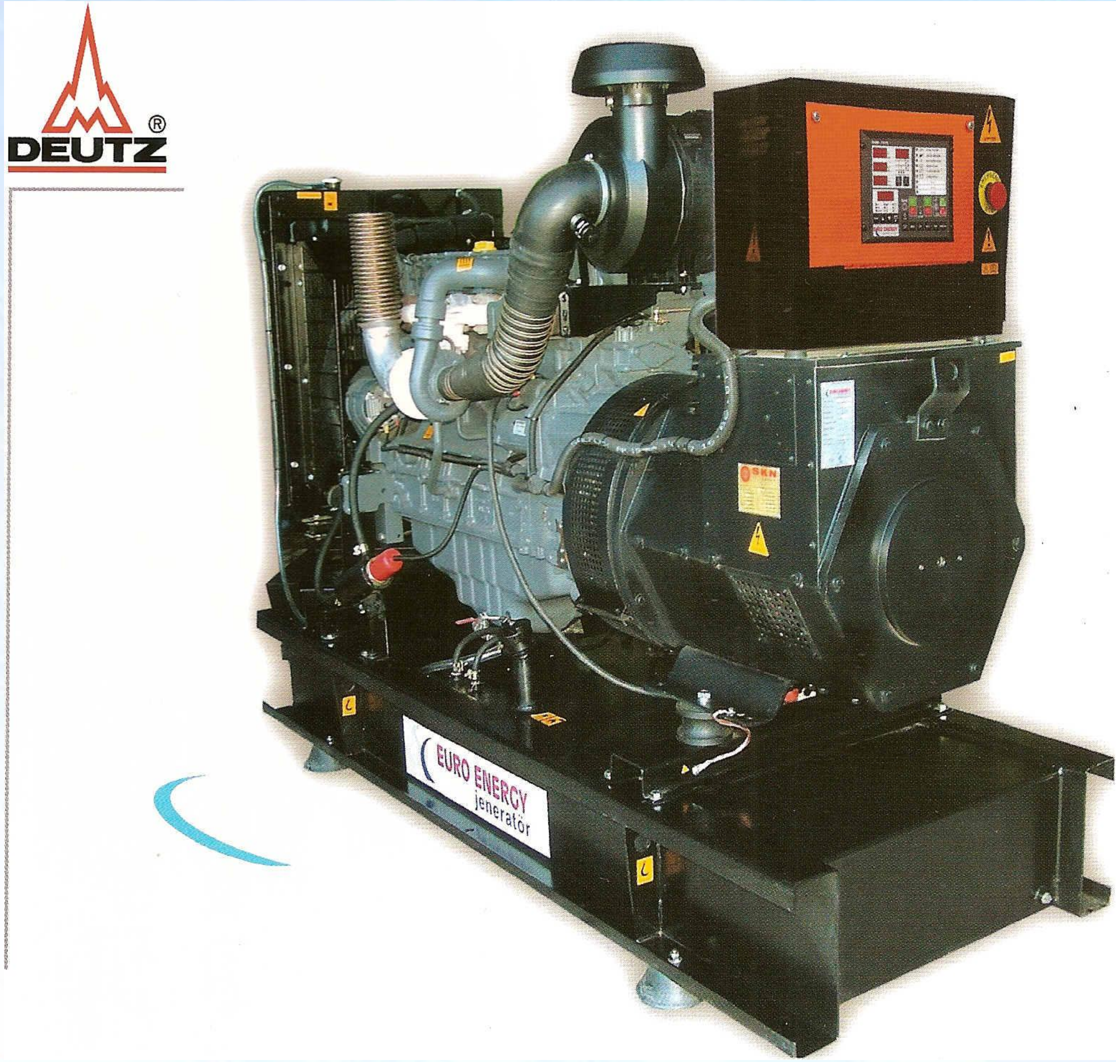


NHD GENERATOR



A magnetohydrodynamic generator directly extracts electric power from moving hot gases through a magnetic field, without the use of rotating electromagnetic

machinery.



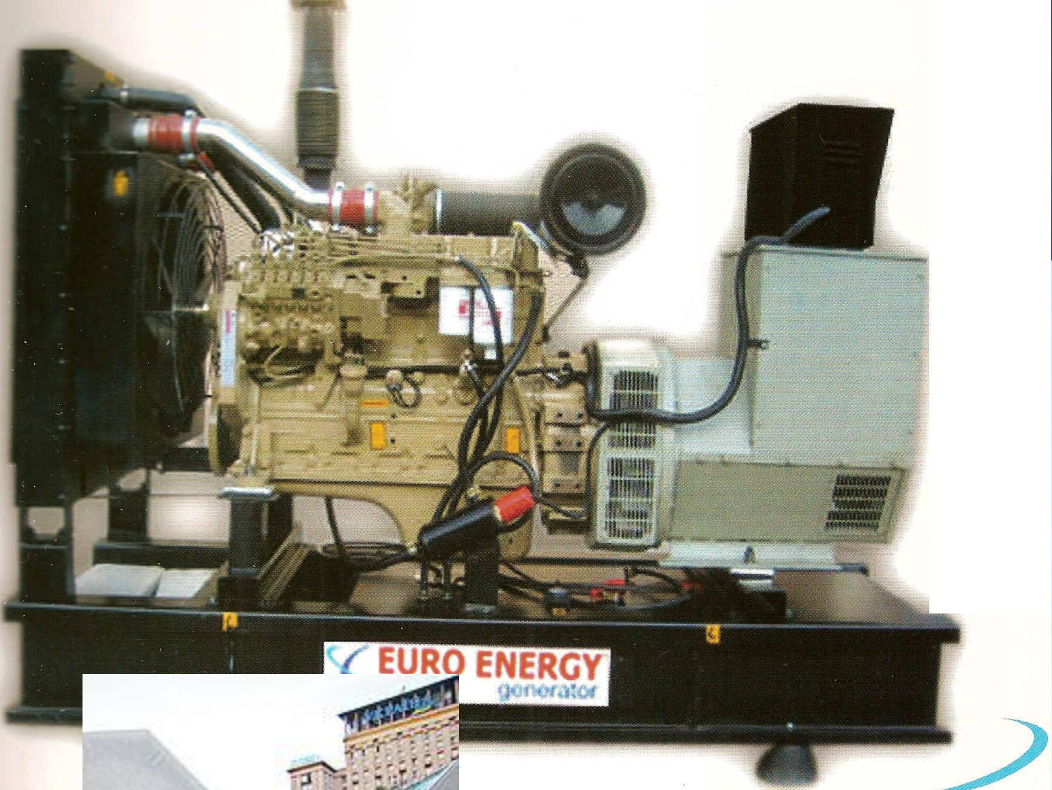
MHD generators were originally developed because the output of a plasma MHD generator is a flame, were able to heat the boilers of a steam power plant.

The first practical design was the AVCO Mk. 25, developed in 1965. The U.S. government performed substantial development, culminating in a 25Mw demonstration plant in 1987. MHD generators operated as a topping cycle are currently (2007) less efficient than combined-cycle gas turbines.

The generator moves an electric current, but does not *create* electric charge, which is already present in the conductive wire of its windings. It is somewhat analogous to a water pump, which creates a flow of water but does not create the water inside.

Other types of electrical generators exist, based on other electrical phenomena such as piezoelectricity and magnetohydrodynamics. The construction of a dynamo is similar to that of an electric motor, and all common types of dynamos could work as motors.

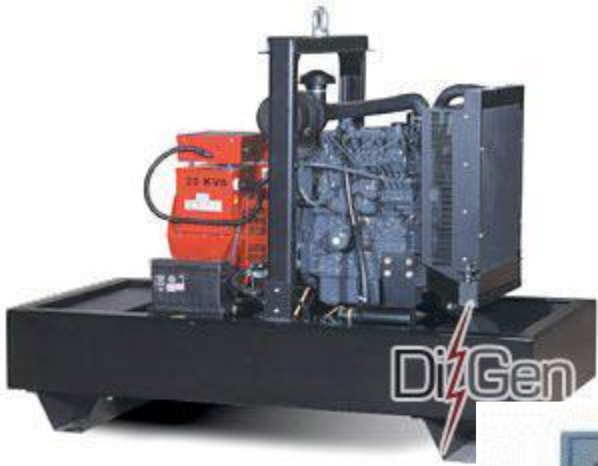
Terminology



The parts of a dynamo can be expressed in either mechanical terms or electrical terms. Although distinctly separate, these two sets of terminology are frequently used interchangeably or in combinations that include one mechanical term and one electrical term. This causes great confusion when working with compound machines such as a brushless alternator or when conversing with people who work on a machine that is configured differently than the machines that the speaker is used to.

Mechanical

- **Rotor:** The rotating part of an alternator, generator, dynamo or motor.
- **Stator:** The stationary part of an alternator, generator, dynamo or motor.



Electrical

- **Armature:** The power-producing component of an alternator, generator, dynamo or motor. The armature can be on either the rotor or the stator.
- **Field:** The magnetic field component of an alternator, generator, dynamo or motor. The magnetic field of the dynamo or alternator can be provided by either electromagnets or permanent magnets mounted on either the rotor or the stator.

END