Applications of AC Generators: 2022 Ultimate Guide

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Applications of <u>AC Generators</u>– Synchronous Generator or Alternators are rotating devices, which are used in many applications. They usually work at constant speed and frequency and get the power of rotation by a prime-mover.

AC generators convert this power to electrical power at a specific voltage and frequency depending on the prime mover and its design. Synchronous generators are usually three phase, and it makes the transmission and distribution much better and have advantages over one phase.

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A wide variety of AC generator equipment, devices, and related products are available on the market today. You can rely on us for as much information as you need to make an informed decision about what is suitable for you. Linquip team of experts would be our pleasure to assist you with any questions you may have about AC generators. Feel free to reach out to us at any time, as we are available 24/7. You might find it helpful to read Linquip's article entitled, "**Generator: Working Principles, Function & Diagram**."

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Alternating Current

Most electrical machines and devices that utilize AC are connected to the global electrical grid. The rest of them, such as laptops or phones, need an AC adaptor for converting AC to the DC form. The advantages of AC over DC made it a more regular global choice. In what follows, a simple review of AC and DC and their advantages are summarized:

- It is easy to step down or up the voltage in AC lines by using transformers.
- AC is easy to use, and has economical transmission for electrical power.
- Using transformers saves a lot of money for suppliers and the consumer and reduces pollution, as power plants need less fuel and produce less pollution.
- AC motors have less maintenance cost.
- By using a circuit breaker, we can interrupt the current easily.
- We can transmit 3 phase current and voltage.

Parts of AC Generators

Ac generators include many parts which rotor and the stator are recognized as the main parts. AC generators can be used in many different applications and can be found in all industries. Because of the versatility and power ranges, they are part of the most advanced systems in modern systems. Parts of generators are:

Field

This part produces the magnetic flux in the presence of the voltage. It has many coils working together and has the responsibility of *excitation* in the generator.

Armature

The voltage source in the generators is the armature, and it is because of the magnetic flux in the system. This part consists of a battery and wires to carry the full load voltage and the current in the system.

Prime Mover

The force or power in the generators, which is the source of physical energy, is called prime mover. Turbines in the gas, hydraulic power plant, and wind harvesting systems are the examples of the prime mover.

Rotor

The rotating part of the generator is called "rotor," as is implied by the name. This part rotates because of the prime mover and can be the armature or the field, depend on the design and applications.

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Stator

It works with the rotor and is the stationary part of the designed system. It can be the armature or the field, same as the rotor.

Slip Rings

Slip rings are electrical connectors in the rotor for transferring power to and from it. It is insulated from the shaft while bounded to the rotor windings. This electric connection to the rotor is made by brushes.

Shaft Bearings

Prime mover connects to the generators by a shaft, which uses many bearing accurately positioned in the system. Using these bearings cut down the friction and "<u>wear and tear</u>."



Basic ac generator parts and their positions (reference: **byjus.com**)

Application of AC Generators

Ac generators are used widely in many different applications. All the power stations use AC generators to produce alternating current. These devices can be categorized based on the different applications of AC generators. Some applications of AC generators are listed below:

- **Marine alternators** these types are used for generating power in marine applications.
- **Brushless alternators** –these types are the main source of power in electrical power plants.
- **Diesel-electric locomotive alternators** locomotives need electric and mechanical power simultaneously, and the source of power is AC generators.
- Automotive alternators modern automobiles use generators for satisfying electric power. All the electric power in the vehicles and charging battery is generated in AC generators.
- **Radio alternators** these types are used for transmission of radiofrequency in low bands.

Application of AC Generators in Long Distance Transmission

AC generators produce an electric current in different power stations. Hydro and wind turbines, power plants, and other energy harvesting systems use AC generators to produce alternating current for cities and facilities. AC is appropriate for the transmission of electrical energy in long-distance, and as a result, AC generators are the essential part of each power source.

Power loss in power transmission is the major problem that should be solved. There are kilometers of transmission lines, and due to the resistance of the cable, power loss shows itself by heating in cables, so we have a lot of power loss in the transmission lines. AC current and transformers include key roles in this process.

Power loss shows itself by a lower voltage at the end of transmission (cities, facilities, etc.). AC can be transmitted easily by using transformers. Power loss is proportional to the I^{2}I2, and we should reduce the current in the lines. Transformers reduce the current and increase the voltage in the lines by using <u>electromagnetic induction</u>.



Using AC generator and transformer in hydro turbines for generation of AC for transmission of power to the cities. (reference: **intl.siyavula.com**)

What Are the Benefits of AC Generators?

Transformers enable AC generators to be easily stepped up or stepped down. Additionally, it reduces transmission losses and the size of transmission links. AC generators have less loss than DC generators. Compactness is one of the features of AC generators.

What Are the Advantages of AC Generators Over DC Generators?

The energy losses associated with AC generators are very low, which makes them very efficient. Sparking and other losses, such as copper, eddy current, mechanical, and hysteresis losses, make DC generators less efficient. An AC generator periodically reverses the direction of the electrical current.

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- What are the parts of AC Generators?
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