The Practical Guide To The Difference Between Gas Turbine and Steam Turbines

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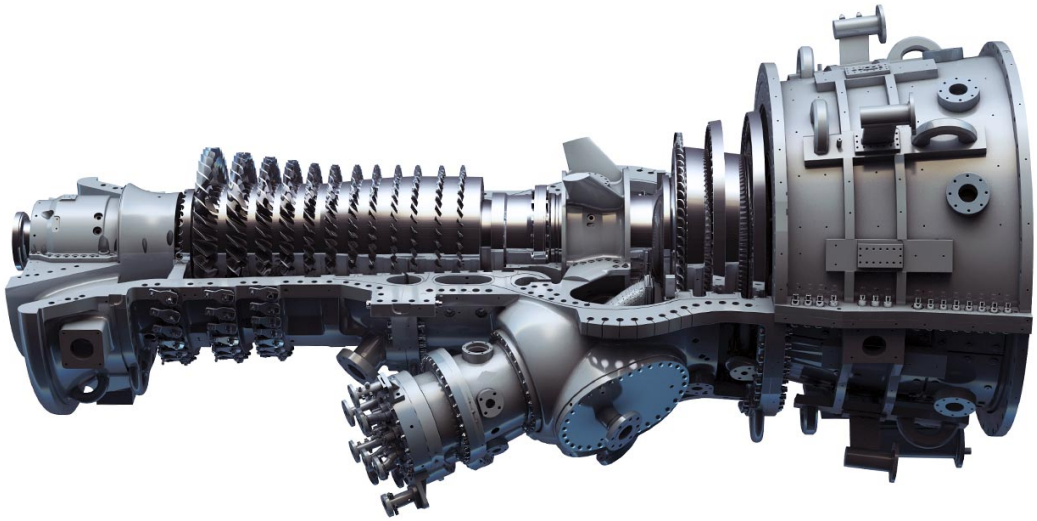
Power plants create electricity by one of several means. Two common elements used to create electricity are steam and gas, each of which require a different apparatus and operating condition to maximize performance. Here's a brief guide to the difference between gas turbine and steam turbines that provides their key distinguishing factors. Read this new blog in Linquip to find out more about them.



Gas Turbines

The gas turbine has become an important, widespread, and reliable device in the field of power generation, transportation, and other applications. A gas turbine is an internal combustion engine, it can burn a variety of fuels which contributes to its great versatility.

The gas turbine is the engine at the heart of the power plant that produces an electric current. The gas turbine is mainly used in the gas turbine power plant. According to the gas turbine working principle, the air is taken from the atmosphere and then compressed into the compressor. The compressed air is then passed into the combustion chamber, where it is heated. The hot compressed air is then made to flow over the blades of the turbine which imparts the rotational motion to the turbine. The major portion of the energy that is developed by the turbine is used to derive the compressor and the remaining is utilized for doing useful work.

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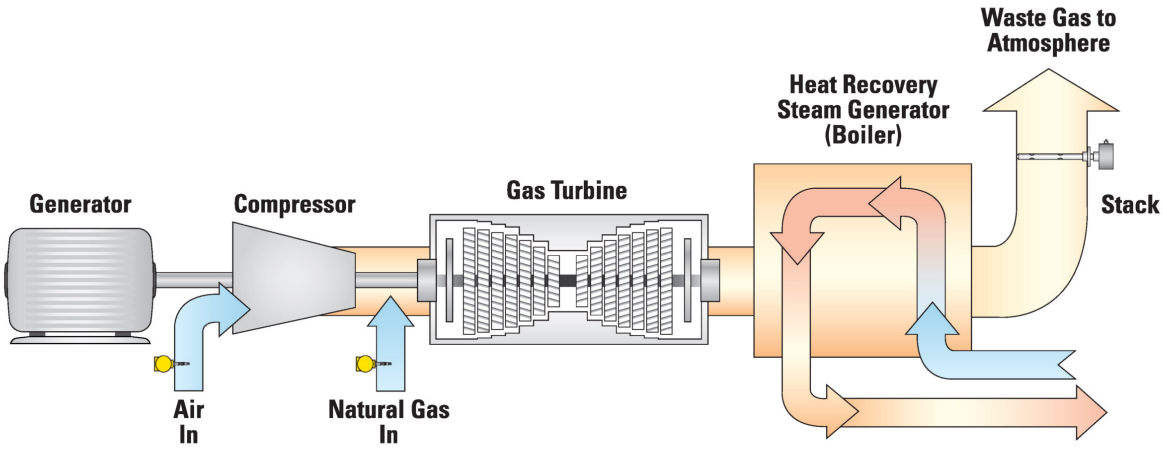
Steam Turbines

As its name suggests, a steam turbine is powered by the energy in hot, gaseous steam and works like a cross between a wind turbine and a water turbine. Steam turbines are designed to transfer energy from fluid to the rotor which can be used as a generator drive for power generation or as a mechanical drive for your rotating equipment such as compressors and pumps.

In a steam turbine, the high-velocity steam is made to strike on the turbine blades. As the steam strikes on the blades, it rotates the rotor of the turbine. The generator is connected to the gas turbine also starts rotating and produces electricity. They are considered the most economical and flexible turbines that you can get.



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Gas Turbine VS. Steam Turbines

The primary difference between gas turbine and steam turbines is the fact that steam turbines receive power from expanding steam. Several factors play an essential role in choosing the best turbine for your application. Here we compare some attributes between these two.

Components

- In the gas turbine, the compressor, combustion chamber, and power turbine are important components.
- In the steam turbine, the steam boiler and accessories are important components.

Starting

- The starting of the gas turbine is easy and quick.
- The starting of the steam turbine is not easy and takes a long time.

Efficiency

- The efficiency of the gas turbine is less.
- The efficiency of the steam turbine is high.

Internal Temperature

- In the gas turbine, the internal temperature reaches 1,500 degrees Celsius, which is significantly hotter than a steam turbine's temperature.
- In the steam turbine, the internal temperature only reaches 500 to 650 degrees Celsius, less than half of the temperature of gas turbine reactions.

Installation Space

- In the gas turbine, less space for installation is required.
- In the steam turbine, more space is required for installation.

Mass Produced

- The mass of gas turbines per kW produced is less.
- The mass of the steam turbine per kW produced is more.

Cost

- The gas turbine requires less installation and running cost.
- The steam turbine requires more installation and running costs.

Controlling

- In the gas turbine, with the changing load conditions, control is easy.
- In the steam turbine, Its control is difficult, with the changing load condition.

Dependency On Water Supply

- A gas turbine does not depend on a water supply.
- A steam turbine depends upon the water supply.

Execution

- The gas turbine engine executes the whole Brayton cycle.
- The steam turbine is only a component executing one step of the Rankine cycle.

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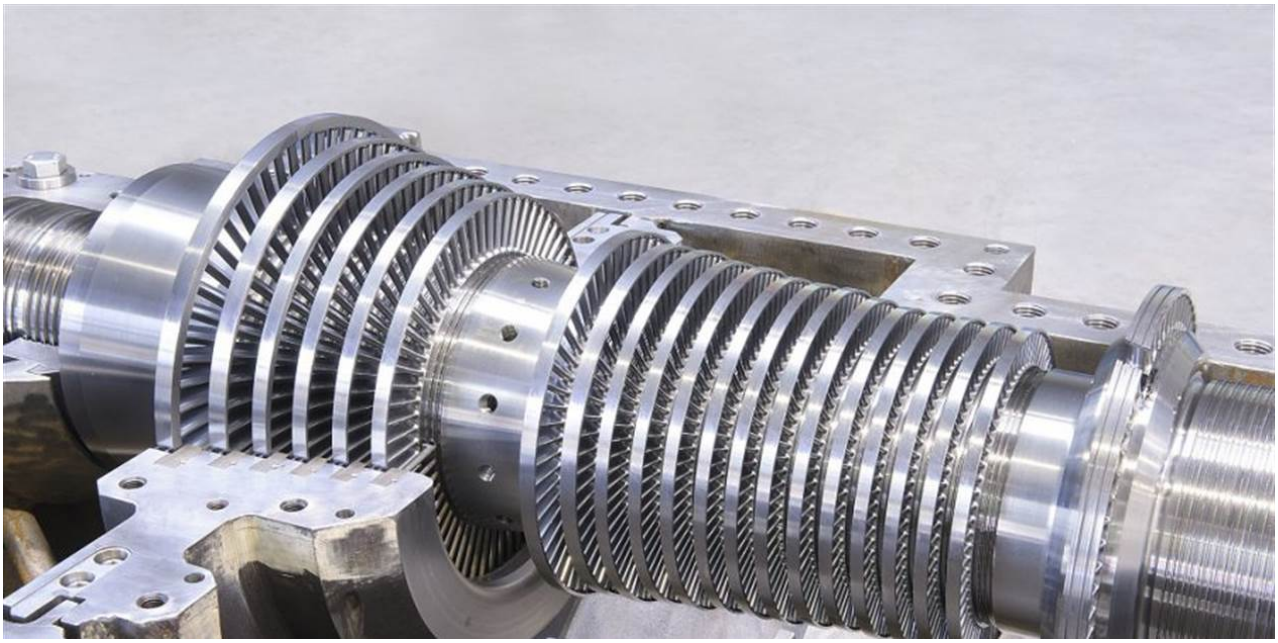
Working Fluid

- The gas turbine uses air or some other gas as the working fluid.
- The steam turbine uses high-pressure steam as the working fluid.



Few points about the difference between gas turbine and steam turbines to keep in mind:

- The centrality of water means there is a risk of freezing. One benefit of steam turbines is, because water is not central to the process, there is no risk of your operation coming to a halt as a result of internal freezing.
- The steam turbine utilizes fuels such as natural gas and also renewable thermal energy for heating that allows for clean energy creation if renewable energy initially heats the turbine's cycling water. The gas turbine as compared to the steam turbine requires fossil fuels and the combustion process inherently creates pollutants such as nitrogen oxide.
- Unlike gas turbines, steam turbines don't have an air compressor or combustion system, but rather a boiler, rotors that transfer thermal energy into mechanical energy, and a casing area that ensures the steam contacts the blades under pressure.
- The gas turbine plant maintenance is low as compared with the steam turbine power plant.
- The gas turbine is a combined device of a compressor, combustion chamber, and turbine executing a cyclic operation to deliver work as either torque or thrust, while the steam turbine is basically an expander delivering torque as the work output.

So, there you have a detailed description of the difference between gas and steam turbines. If you enjoyed this article in Linquip, let us know by leaving a reply in the comment section. Is there any question we can help you through? Feel free to sign up on our website to get the most professional advice from our experts.