Steam turbine definition

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steam-turbine locomotive

Britannica : Encyclopedia article about steam turbine

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The speed of the steam turbine is directly proportional to the output power. Therefore, the steam turbines must work at the highest speed if you want to achieve the highest output. The wheel turbines can"t rotate at high speed like a steam turbine.These turbines have many advantages over other types of turbines such as steam turbines produce inexpensive electricity, and steam energy doesn"t pollute the environment.

Image source: schoolworkhelperDuring the working of a steam turbine, first of all, water from an external source (such as a river, sea or canal) is transferred into the boiler section with the help of a pump. The boiler boils the water to a very high temperature so that water can convert it into supersaturated steam.

Read Also: Working of Gas TurbineTypes of Steam TurbinesThere are multiple types of steam turbines designed according to their different operations and their industrial importance. The types of steam turbines are given below:

ii) Back Pressure Steam TurbineIn this turbine, the steam in the turbine doesn"t expand completely. After partial use of the steam thermal energy inside the turbine, all of the steam is released at a specific temperature and pressure.The steam parameters at the discharge are determined according to the process requirements.iii) Extraction Cum Condensing TurbineThe extraction cum condensing turbine has two inlet valves. The first stage of the turbine is known as the "High Pressure (HP) stage," and the second stage is known as the "Low Pressure (LP) stage."

Read Also: Working of Turbofan Engine2) Types According to Heat Drop ProcessIn this category, steam turbines have the following types:i) Condensing turbine with generatorIn this type of turbine, steam is sent to the condenser chamber at a pressure below than the atmospheric pressure.In this turbine, the steam is discharged from the intermediate stage and used to heat the feed water. The exhaust steam"s latent heat during the condensation process is dropped completely.

3) Types according to the steam conditions at the turbine inletThe steam turbine has the following types in this category: i) Supercritical Pressure TurbinesThese turbines use steam with a pressure greater than 225 atm.

ii) Ultra-high Pressure TurbineIt uses a temperature of 550? C or more and a steam pressure of 170 atm or more.iii) High-Pressure TurbineIt uses steam with pressures of more than 40 atm.iv) Medium Pressure

TurbineThese turbines consume up to 40 atm of steam pressure. v) Low-Pressure TurbinesThese types of steam turbines use steam with a pressure of 1.2 atm to 2 atm.4) Types according to industrial useAccording to the industrial applications, the steam turbine has the following types.

According to the design of blades, steam turbines divide into two main types.

i) Reaction TurbineIn the reaction turbine, the steam flows through the blades. Then, it expands on both the moving blades and fixed blades of the turbine. Moving and fixed blades have a continuous pressure drop.Reaction turbines are a little bit dissimilar from impulse turbines, which consist of fixed nozzles and moving blades. As compared to impulse turbines, reaction turbines have a lower pressure drop per stage. A reaction turbine is generally more efficient.An example of a reaction turbine is a Parson"s turbine. The reaction turbine requires twice as many rows of blades as the impulse turbine for the conversion of the same heat energy.