# High inlet and outlet air temperature of steam turbine generator

How does turbine inlet temperature affect power output?
The increase in turbine inlet temperature means an increase in superheat at constant inlet steam pressure and condenser pressure gives a steady improvementin the power output of the turbine. Raising the inlet steam temperature also reduces the wetness of the steam in the later stages of the turbine and improves the power output of the turbine.

What is the inlet temperature of a steam turbine?
The highest inlet steam temperature currently applied to actual supercritical pressure and USC steam turbines is between 566°C and 620°C.However,a next-generation A-USC pressure steam turbine project is aiming at 700°C-class inlet temperature application,as a national development project.

How does vapor quality affect steam turbine inlet flow?
Other significant conclusions are as follow: By increasing steam turbine outlet vapor quality,the temperature and pressure at steam turbine inlet flow will be increased. An increase in HRSG high pressure and decrease HRSG low pressure,increases system exergy efficiency and decreases the total rate of the system.

Why is a higher inlet steam temperature important?
Raising the inlet steam temperature also reduces the wetness of the steam in the later stages of the turbine and decreases specific steam consumption. At lower temperature, enthalpy will be low, work done by the turbine will be low, turbine efficiency will be low, hence steam consumption for the required output will be higher.

Why is steam turbine efficiency the highest value?
Steam turbine efficiency has the highest value for the quality of 88% outlet with no cost constraint due to high superheat degree at the inlet. The high superheat degree in steam turbine inlet allows higher turbine efficiency to be selected regardless of the quality constraint at outlet.

How does steam inlet pressure affect design efficiency?
To retain the design efficiency the steam inlet pressure should be maintained. Lowering steam inlet pressure reduces turbine efficiency and increases steam consumption. A 10% increase in steam pressure will reduce the steam consumption by about 1% in a condensing steam turbine and by about 4% in a back pressure steam turbine.

Similarly power output of GT is directly proportional to inlet & outlet temperature difference of turbine and sum of mass flow rates of air & fuel. As there is no variation in inlet & outlet temperature difference of turbine, decreases the power output of GT is due to the decrease in mass flow rate of air. Since increase in AAT decreases

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Abstract. To achieve higher thermal efficiency, gas turbines operate at increasingly higher turbine inlet temperatures, leading to the need for advanced cooling methods such as film cooling, impingement cooling, and passage cooling in modern high-pressure turbines (HPTs). However, accurately predicting the nonuniform temperature distribution at the HPT ...

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steam turbine to suit a customer"s process steam needs. Single-shaft steam turbine designs are available. Mechanical Drive Steam Turbines Mechanical-drive steam turbines (Figure 6) range from 3 to 60 MW (80,000 BHP), with speeds of up to 16,000 rpm, and are either con-densing or non-condensing types. Complete steam turbine compressor packages ...

The inlet system of the turbine is designed to connect the compressor outlet port of 6 mm dia to the turbine having an inlet of 4 cm thickness. The area of the inlet is 0.4 (textrm{cm}^2), which is segregated using slit configurations to guide air to each gap with minimum interaction with the peripheral walls of the rotor.

Main Steam Temperature-1,000 F; Turbine Outlet Steam Pressure- Atmospheric (14.7 psia) Consider Example 1. The steam tables show that the enthalpy of the turbine inlet steam is 1,505.9 Btu per ...

This paper shows the effect of excess air on combustion gas temperature at turbine inlet, and how it deter-mines power and thermal efficiency of a gas turbine at different pressure ratios and ...

atures at the inlet and outlet of the HP and IP turbine sections. Isolation of the turbine cycle is also important because it can significantly affect the electrical output of the unit. Enthalpy Drop Test ...

2.2 ENCLOSED GENERATOR - Check the air intake louvers are not drawing air from an enclosed area where the ambient air is not well ventilated and starts to rise in temperature beyond that of the ambient air. Verify outlet air is not restricted and limiting the air cooling flow. Radiators for engine coolant and charge-air cooling

high temperature exhaust flue gas from turbine utilized for heat recovery in steam generators. The rotating turbine drive shaft powers the generator through reduction gearbox for electricity generation. II. GAS TURBINE EXHAUST TEMPERATURE SPREAD BASICS: An exhaust temperature spread refers to a high differential in temperature readings between

Assume the specific heats are functions of temperature and take account of the pressure drops P 1, P 23 and P 4. Find the following:-8. Compressor outlet temperature T 2ea in Kand C, due to compression efficiency ? c and the inlet pressure drop P 1. 9. Turbine outlet temperature T 4ea in Kand C, due to expansion efficiency ? t, the combustion

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The temperature of the outlet high ... The enthalpy of the outlet steam ca n be determined as a ... every 1? increase in gas turbine inlet air temperature averagely results in 0.879% decrease in ...

The results showed that induced air temperature was dropped in the range between 8 and 24 °C across the earth-air pipe heat exchanger and the system effectiveness varied between 0.3 and 0.7...

In the plant, the combustion gas is first used to generate power by driving a turbine. High-temperature turbine exhaust gas is next utilized at a regenerator to heat the main working fluid of CO2 ...

Figure 5 illustrates the variation in the overall efficiency of a CCGT and power output in the GT cycle, ST cycle and the CCGT power plant in relation to the ambient temperature. Turbine inlet ...

A steam turbine"s power and/or efficiency can be quickly and accurately calculated using Flexware"s Steam Flex steam properties program. It will be necessary to obtain the following operating data from the field. Inlet steam pressure Inlet steam temperature Inlet steam flow rate Extraction steam pressure (if extraction type)

Gas turbines powered by natural gas are becoming increasingly popular in power plants due to their superior efficiency and low emissions levels [1].Unfortunately, these gas turbine engines suffer from their inability to maintain efficient operation at high ambient temperatures [2, 3].Every 1 °C increase in ambient temperature above ISO conditions causes a ...

HRSG facilitates the recovery of heat from the hot gas stream coming out of the gas turbine plant and utilizes this to produce steam to be used in a steam turbine plant for additional generation of work (Zhao et al., 2009).However, for effective waste heat recovery application, heat content of gas, flow rate, density of hot stream gas, and specific heat of hot ...

The temperature of exhaust gases from simple cycle gas turbine generation sets (GENSETs) is usually very high (around 500 °C), and a heat recovery steam generator (HRSG) is often used to recover ...

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For a steam turbine-generator to operate at its optimum level of thermal performance, it must ... atures at the inlet and outlet of the HP and IP turbine sections. Isolation of the turbine cycle is ... High Pressure Turbine Stop &  Intercept Stop Valves Valves Control Valve Chest Figure 3.

In the gas turbine (see Gas Turbine) the pressure ratio ? T (that is the ratio of the working fluid pressure at the turbine inlet to the pressure at the turbine outlet) is not very large (usually not higher than 20-30) but the initial ...

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An ambient temperature of 37 °C caused an average power loss of 17%, accompanied by an efficiency drop of 2.2% compared to the gas turbine design value [3].Actual data shows that the gas turbine lost 0.1% in thermal efficiency and 1.47 MW of its power output for every °C rise in ambient temperature above ISO conditions [4].Likewise, a gas turbine ...

Operating with a negative MTC is favorable operational characteristics also during power changes.There is an exact energy balance between the primary and secondary circuits at normal operation. Therefore when the operator ...

A novel adjusting method for improving gas turbine (GT) efficiency and surge margin (SM) under part-load conditions is proposed. This method adopts the inlet air heating technology, which uses the waste heat of low-grade heat source and the inlet guide vane (IGV) opening adjustment. Moreover, the regulation rules of the compressor inlet air temperature and ...