

Brayton cycle combined

Which of the following statements is NOT true:

Answer: The effectiveness of a regenerator is defined as the ratio of the theoretically maximum heat that can be regenerated over the actual heat that is regenerated.

Explanation: The effectiveness of a regenerator is defined as the ratio of the actual heat that is regenerated over the theoretically maximum heat that can be regenerated $= q_{regen,actual} / q_{regen,max}$. That means that this statement is false.

The other statements are all true:

- There is no net work output in a jet propulsion cycle. The system is designed in such a way that the gases are not expanded to the ambient pressure but to a higher pressure such that the power produced by the turbine is just sufficient to drive the compressor.
- Steady flow compression or expansion work is proportional to the specific volume of the working fluid. Therefore, the specific volume of the working fluid should be as low as possible during a compression process and as high as possible during an expansion process.
- Intercooling reduces the thermal efficiency as the average temperature at which heat is added reduces.
- Reheating reduces the thermal efficiency as the average temperature at which heat is rejected increases.
- In an ideal regenerator the outlet temperature of the regenerator is equal to the outlet temperature of the compressor and the inlet temperature of the regenerator is equal to the outlet temperature of the turbine.