

Brayton cycle combined

A Brayton cycle with intercooling and reheating is modified to improve the thermal efficiency by adding a regenerator. The effect of adding the regenerator on the net power output and the temperature of the exhaust gases is

Answer: The net power output remains the same and the temperature of the exhaust gases decreases.

Explanation: In a cycle with intercooling and reheating the temperature at the outlet of the compressor is relatively low and the temperature at the outlet of the turbine is relatively high. Regeneration increases the thermal efficiency of a Brayton cycle by capturing some of the waste heat from the exhaust gases and preheating the air before it enters the combustion chamber. This results in a lower temperature of the exhaust gases since a part of the energy in the exhaust gases is transferred to the high pressure air at the compressor outlet to preheat it. The net work output remains the same as the regenerator has no influence on the power input of the compressor or the power output of the turbine.