

Some key technology of Stirling engines using waste heat

TANG, DaWei

Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing 100190, China

Abstract:

At present, the energy power or metallurgical manufacturing industries operating in the production process emit much waste heat with high recycling value. According to industrial emissions of heat temperature, heat can be divided into low, middle, and high grade. High-temperature exhaust gas emissions in industry is a kind of high-grade waste heat, such as: cement exports in the pre-heater exhaust gas temperature can reach 550 °C ~ 650 °C. If this heat at this temperature is used to drive Stirling engines to generate electricity, then it is used very suitable in terms of the cascade of energy and industrial economic point of view.

Stirling engine is traditionally known as an external combustion engine in contrast to an internal combustion engine where the heat input is by combustion of a fuel within the body of the working fluid. It works for closed cycle. High efficiency of Stirling engine, in theory, in the same temperature limits under the Carnot cycle efficiency. If the waste heat which drives Stirling engines is at 600 °C, then the theoretical efficiency can reach 57%, while a well-designed practical Stirling engine efficiency will be about 30%.

The exchangers are key parts of the Stirling engines. Under certain mechanical structure, the performance of the heat exchangers directly determines the output power and overall efficiency of a Stirling engine. Therefore, it is necessary to specially research and design the exchangers for the Stirling engines which are driven by Waste heat at high temperature.

Keywords:

Waste heat ,Stirling engines, high temperature, power