Does the Use of Pyrolytic Graphite and Phase Change Material Improve Stirling Engine Performance?

Lossef, Samuel

The purpose of this project was to determine if the use of a) pyrolytic graphite heat sinking and of b) phase change material affects the performance of a Stirling engine. Rotational speed and temperature were measured, using a low temperature differential (gamma) Stirling engine modified by a) adding pyrolytic graphite sheeting as a heat sink, and by b) applying a phase change material to the upper engine plate, as compared to a control engine with no modifications. The use of the pyrolytic graphite heat sink was found to improve performance by increasing the mean peak rotational speed by 10.2% ($p=0.016$) and the duration by 45.1% ($p=0.0007$), compared to controls. On the other hand, use of the phase contrast material was found to diminish performance, decreasing the mean peak rotational speed by 21.4% and the duration by 16.4%, compared to controls. In conclusion, the use of pyrolytic graphite is a promising enhancement of Stirling engine performance.

Awards Won: