

The Performance of Beta Type Stirling Engine Using Different Fuel



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Abstract Stirling engine categorized as external combustion engine which defined as a closed-cycle regenerative heat engine to perform the conversion of energy into the mechanical power. The thermal efficiency of the Stirling cycle always is the main criterion, and the literature showed its efficiency of energy conversion is consider relatively as high as the Carnot cycle. Although the Stirling engine consists of great versatility for energy sources, however still inadequate efforts were done for the development of the Stirling engine that is powered by combustion fuel, since generally the engine is fueled by renewable energy which is inapplicable by the public. Therefore, the objectives to fill up the research gaps are to simulate the operation condition of Beta type Stirling engine by manipulated the use of different fuels with the assistant of MATLAB then compared with the outcome of a reference model to validate the outcome and to acquire the optimum performance of the engine, and any index that brings a reputation for the development of the Stirling engine. Compression ratio, and the temperature of the heater that affected by the specifications of Stirling engine design and effective volume of the heater, respectively act as the major element that manipulated the final power output. A higher compression ratio of 18 and power output of 315.88 Watts can be obtained with smaller clearance between the engine primary components, besides the heater temperature that achieves 855.75 K and thermal efficiency of 64.93% is affected by the usage of appropriate combustion fuel as gasoline and bigger effective volume of the heater.

Keywords Engine performance · Stirling engine · Beta type · Combustion fuel · MATLAB · single crank driven mechanisms

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