Journal of
Biomolecules and Biochemistry

Abstract

Design and Optimization of an Integrated Turbo-Generator for Vehicle Exhaust Electrical Energy Recovery

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Abstract:

The performance of turbo-generators significantly depends on the design of the power turbine. This research aims to design and optimize an integrated turbo-generator for diesel engines. The goal is to generate electricity from the vehicle exhaust gas. Electrical energy is derived from generators using the flow, pressure, and temperature of exhaust gases from combustion engines and heat-waste. In the case of turbo-generators and thermoelectric generators, the system automatically adjusts the power provided by an inverter. Typically, vehicle exhausts are discarded to the environment. Hence, the proposed conversion to electrical energy will reduce the alternator charging system. This work focuses on design optimization of a turbo-generator for 2500 cc. diesel engines, due to their widespread usage. The concept, however, can also be applied to gasoline engines. Moreover, this model is designed for a hybrid vehicle. Charging during running will save time at the charging station. The optimization by variable van angles of 40°, 50°, 62°, 70°, and 80° shows that the best output power is 62°, which is identical to that calculated. The maximum power outputted from the designed prototype was 1262 watts when operating with an exhaust mass flow rate of 0.1024 kg/s at 3400 rpm (high performance of the engine). This research aims to reduce fuel consumption and reduce pollution from the exhaust, especially for hybrid vehicles.

Biography:

Prasert Nonthakarn works as professors at Department of Industrial Technology, Faculty of Science and Technology, Rajamangala University of Technology Srivijaya, Thailand. Teaching in the field of mechanical design, automation, simulation and control system for 20 years

and has been working machine design for the factory as well as the tools for agricultural processing..

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Citation: Prasert Nonthakarn ; Design and Optimization of an Integrated Turbo-Generator for Vehicle Exhaust Electrical Energy Recovery; Renewable Energy 2020; October 26, 2020; London, UK