J Aeronaut Aerospace Eng 2017, 6:3 (Suppl)
DOI: 10.4172/2168-9792-C1-020

The development of the Szorenyi rotary engine

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A four-chamber Otto-cycle rotary engine, the Szorenyi Rotary Engine, has been developed by the Rotary Engine Development Agency in Melbourne, Australia. The engine has been awarded a US patent. The geometric shape of the engine rotor is a rhombus which deforms as it rotates inside the contour of a mathematically defined stator. The resulting engine design has a four-segment hinged rotor which creates four combustion chambers. Each chamber produces the four phases of the Otto cycle for every rotation of the rotor. The result is an engine which is similar in operation and size to a Wankel engine, but with four times the power density. The Szorenyi engine could be used in all current applications of Wankel and reciprocating engines. This paper describes the derivation of the mathematical formula of the stator profile and shows that the profile can be varied to optimize the combustion chamber shape and hence engine performance. This paper traces the engineering solutions to create a four-segment hinged rotor with incorporated seals. The successful proof-of-concept engine test is described, and the subsequent tear-down and detail design improvements that were made. The ideal mathematical modeling of the engine, recently completed by RMIT University (Melbourne), is described. The modeling compared the Szorenyi engine with an equivalent reciprocating engine and a Wankel engine. The engines' combustion chamber geometries were modeled and the fuel burn was analyzed using a Wiebe function. The paper describes how the slower rate of change of combustion chamber volume of the Szorenyi engine either side of top dead center results in a 0.64% higher thermal efficiency than the equivalent reciprocating engine and 0.21% higher than the equivalent Wankel engine. The paper discusses about the further development planned for prototype engine testing and more advanced computer modeling.

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