World Academy of Science, Engineering and Technology
International Journal of Materials and Textile Engineering
Vol:13, No:02, 2019

The Effect of Micro-Arc Oxidation Coated Piston Crown on Engine Characteristics in a Spark Ignited Engine

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Abstract : In present investigation, experiments were carried out to compare the effect of the ceramic coated piston crown and uncoated piston on combustion, performance and emission characteristics of a port injected Spark Ignited engine. The piston crown was coated with aluminium alloy in the form ceramic oxide layer of thickness 500 µm using micro-arc oxidation technique. This ceramic coating will act as a thermal barrier which reduces in-cylinder heat rejection and increases the durability of the piston by withstanding high temperature and pressure produced during combustion. Flame visualization inside the combustion chamber was carried out using AVL Visioscope combustion analyzer to predict the type of combustion occurs at different load condition. Based on the experimental results, it was found that the coated piston shows an improved thermal efficiency when compared to uncoated piston. This is because more heat presents in the combustion chamber which helps efficient combustion of the fuel. The CO and HC emissions were found to be reduced due to better combustion of the fuel whereas NOx emission was increased due to increase in combustion temperature for ceramic coated piston.

Keywords : coated piston, micro-arc oxidation, thermal barrier, thermal efficiency, visioscope
Conference Title : ICSEAC 2019 : International Conference on Surface Engineering and Advanced Coatings
Conference Location : Rome, Italy
Conference Dates : February 18-19, 2019