

Analysis of the cylinder head for a spark ignition engine using zonal cooling principle

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Abstract

In the paper, it is performed a detailed thermo-structural analysis of the cylinder head for a spark ignition engine using the zonal cooling principle. The zonal cooling principle assumes two cooling circuits, one for the cylinder head and one for the cylinder block and a continuous adjustment of cooling temperature in accordance with the working principle. By using this principle, it is considered the possibility of using higher values of the volumetric compression ratio, leading to the increase of the engine performance. Thus, the reduction of the temperature of the fresh air fuel mixture in the intake channel and the lower temperature of the fresh air fuel mixture, when getting in contact with combustion chamber walls, leads to a delay of self-ignition and finally the detonation can be suppressed. Due to the possibility of using a higher compression ratio, the thermo-structural analysis was performed using ANSYS Workbench.

Keywords: cylinder heads, spark ignition engines, zonal cooling, fuel mixtures, combustion chambers

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