World Academy of Science, Engineering and Technology
International Journal of Mechanical and Industrial Engineering
Vol:13, No:07, 2019

Investigation of Leakage, Cracking and Warpage Issues Observed on Composite Valve Cover in Development Phase through FEA Simulation

Authors : Ashwini Shripatwar, Mayur Biyani, Nikhil Rao, Rajendra Bodake, Sachin Sane

Abstract : This paper documents the correlation of valve cover sealing, cracking, and warpage Finite Element Modelling with observations on engine test development. The valve cover is a component mounted on engine head with a gasket which provides sealing against oil which flows around camshaft, valves, rockers, and other overhead components. Material nonlinearity and contact nonlinearity characteristics are taken into consideration because the valve cover is made of a composite material having temperature dependent elastic-plastic properties and because the gasket load-deformation curve is also nonlinear. The leakage is observed between the valve cover and the engine head due to the insufficient contact pressure. The crack is observed on the valve cover due to force application at a region with insufficient stiffness and with elevated temperature. The valve cover shrinkage is observed during the disassembly process on hot exhaust side bolt holes after the engine has been running. In this paper, an analytical approach is developed to correlate a Finite Element Model with the observed failures and to address the design issues associated with the failure modes in question by making design changes in the model.

Keywords : cracking issue, gasket sealing analysis, nonlinearity of contact and material, valve cover
Conference Title : ICSMFEA 2019 : International Conference on Solid Mechanics and Finite Element Analysis
Conference Location : Toronto, Canada
Conference Dates : July 18-19, 2019