Redesign of Mobile Evaporator Structure to withstand the Operational Vibration

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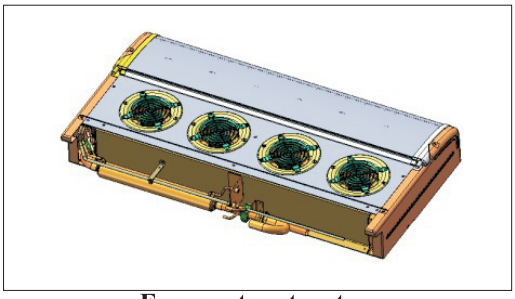
Keywords: Evaporator Structure, Random Vibration Analysis, Fatigue Life, Redesign

Abstract:

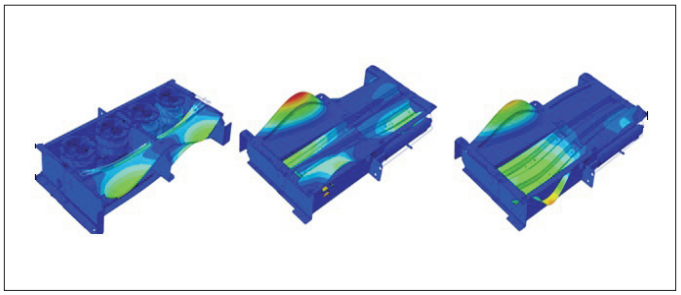
In the modern world the study of vibration becomes an important objective to develop any new products or to resolve the failure problems in the existing product, particularly in the automobile field. This project, the work was related to analysing repetitive failure of the evaporator assembly mounted in truck units. Main focus was given to analyse the road induced vibration effect on the evaporator structure.

To address the problem of field of evaporator structure, it was analysed under operational loads. Operational loads were obtained from basic transportation induced vibration PSD curve from MIL-STD-810D. The structure was analysed to road induced random vibration using FEA. Based on the stress results, fatigue life of the structure was calculated using Miner cumulative damage rule.

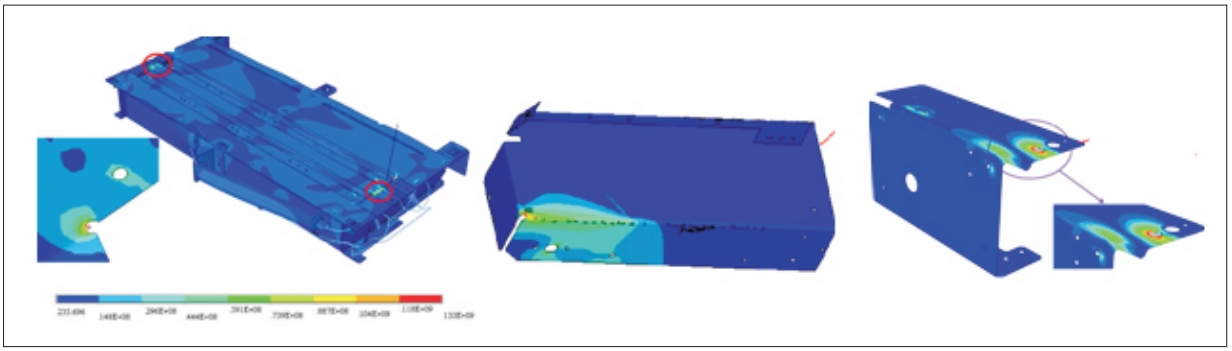
Design and material of the failure components were changed to reduce the stress levels. The suggested design brought down the fatigue damage ratio below one as per Miner's safe criteria and made structure to withstand operational vibration under three sigma stress levels.



Evaporator structure



Mode shapes of the evaporator



RMS stress level under random vibrations