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Development Of Hydrocarbon Adsorber Technology Using Foam For Engine Air Intake Systems

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ABSTRACT

When an automobile engine is turned off, there remains a small amount of unburned fuel on the intake side of the engine. Some of the fuel vapor migrates through the air intake system and escapes into the environment. Such evaporative emissions have been proven to be harmful to the environment and to contribute to the generation of smog. In the US, evaporative emissions regulations have been set at both the state and federal levels. In order for vehicle manufacturers to comply with today's stringent evaporative emissions requirements, many cars are equipped with a hydrocarbon adsorbing device that is packaged within its air induction system. The primary function of these adsorbers is to trap unburned fuel vapor while the engine is off and retain it until the engine is started again. With the engine once again running, the fresh intake air drives the adsorbed hydrocarbon vapor from the adsorber and into the engine, where it is consumed through combustion. The hydrocarbon adsorber is hence purged and available to function once again during the engine off period. In this paper, the design and development of an activated-carbon-coated reticulated foam hydrocarbon adsorber is reviewed. For an acceptable design, three main attributes must be considered: efficiency, capacity and thoroughness of purge. In addition to its primary function, it is imperative that the adsorber does not significantly degrade other functions of the air induction system. Such functions may include air filtration, flow restriction, mass air flow metering, NVH control, and durability. Design challenges are explored and solutions presented such that the final product is robust and reliable in an under hood environment.

BIOGRAPHY, SHORT SKETCH

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Bio

Mr. Arruda received a M.S. degree in Acoustics from the Pennsylvania State University in 1988, at which time he took a position at Textron Defense Systems, where he developed land based passive acoustics and seismic sensing and vehicle tracking systems. In 1992 he started with Ford Motor Company in the Air Induction Systems Engineering group where he focused on induction system acoustics and tuning. At Ford, and later with Visteon where he is currently employed, Mr. Arruda has gained experience in the design, development, manufacture and testing of air cleaners, intake manifolds, fuel tanks, fuel delivery systems, and evaporative emissions control devices such as carbon canisters and hydrocarbon adsorbers. Mr. Arruda is currently the Engine Induction Systems Manager at Visteon and is responsible for EIS Product Engineering and Global Core and Advanced Technologies.