

Presentation Title: Drivability of the FIAT 500 Multi-Air Engine under Simulated Poor Maintenance

Description: The FIAT Multi-Air valve-train uses hydraulic, mechanical, and electric components to control engine intake valves for more precise combustion. However, the incorporation of electronics and hydraulics creates additional potential for drivability issues. This study will simulate poor vehicle maintenance in a FIAT 500 Multi-Air engine to identify drivability concerns generated.

Abstract: The mechanical camshafts that have been in nearly all internal combustion engines for the last century are seeing interesting technological upgrades from vehicle manufacturers. Systems such as variable valve timing, VTEC, and Multi-Air incorporate new technology into the engine valve-train in order to further control the engines ability to breathe air, thus controlling combustion. Tests have shown the performance and efficiency benefits of these technologies. However, each of these examples is more complicated and has more moving parts when compared to traditional valve-trains. Does the incorporation of electronics and hydraulics create additional potential for drivability issues in the face of poor maintenance? The FIAT Multi-Air system is one of the most recent examples of advancements in valve-train technology. This study will simulate poor vehicle maintenance in a FIAT 500 Multi-Air engine to identify potential drivability concerns generated by poor (or lack of) maintenance.

This study will begin by identifying the maintenance recommendations for the FIAT 500 1.6 Liter MultiAir Engine. Then, the vehicle will be baseline tested on a dynamometer within a controlled environment. Then, the vehicle will be manipulated to simulate poor engine maintenance that is beyond the manufacturer's recommended allowance. An electronic scope will be used to observe changes in the Multi-Air electronics and a scan tool will be used to observe any diagnostic trouble codes. Under simulated conditions, the vehicle will be dyno tested throughout a range of operating conditions. Test results will then be analyzed to identify the robustness of the Multi-Air valve-train system and the effects that poor maintenance may have on drivability. The practical use for this study is for potential customers of the FIAT 500 to understand the robustness of the Multi-Air engine and for current owners of the FIAT 500 to understand the effects of poor maintenance on vehicle drivability.

Keywords: FIAT 500, Multi-Air, Maintenance