

A REVIEW PAPER ON EFFECT OF INTAKE MANIFOLD GEOMETRY ON PERFORMANCE OF IC ENGINE

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ABSTRACT

Intake manifold & its components play crucial role in deciding the performance of an IC engine. Engine breathing can be easily related to the intake geometry as per the different researchers worldwide. Intake manifolds affect the volumetric efficiency which ultimately makes impact up on the engine power & torque. Conventional intake manifolds have fixed geometry & thus does not cater for the demand of wide range of engine speeds. This paper reviews the work done by various prominent researchers in the field of intake tuning & variable intake manifold. It can be easily concluded that for getting maximum volumetric efficiency throughout the engine operating speed the intake geometry needs to be changed. At lower engine speed intake length must be long for proper breathing of engine while at higher speeds intake length must be short. Considerable gain in torque & fuel economy can be observed with variable intake length manifold.

Keywords: intake manifold, intake tuning, Plenum, torque characteristics, engine performance, charging.

1. INTRODUCTION

Inlet manifold is the part of an engine that feeds the fuel/air mixture to the cylinders & it consists of air filter, intake pipe, plenum and intake runners. The duty of the intake manifold is even distribution the air fuel mixture (or just air in a CI or Direct Injection engines) to each intake port in the cylinder head. Even distribution is important to get optimum of the efficiency and performance of the engine. It may also accommodate the carburetor, throttle body, fuel injectors and other components of the engine.

Growing demand for increased engine power, torque & reduced emissions led engineers to look towards various engine components to find whether there is any scope to improvement in their design and or layout. This motivation led towards the important engine component that is intake manifold. It is now known fact that proper design of intake manifold can improve the engines performance. Intake tuning is the term which is used to define the improvement or change in intake manifold to get maximum benefit of the in cylinder motions & pressure effects by changing the geometrical aspects of the intake system. Traditional intake manifold design and optimization is based on actual physical tests of various geometries on test bench. Engine manifolds were produced & mounted on the engine & tests were conducted. This trial and error method can be effective but is very expensive and time consuming. Besides, this method cannot provide any information about the actual flow parameters inside the intake manifold. Using Intake Manifold with Symmetrical geometry has been the design by choice. Now a day's engineers try to simulate the actual real world working conditions to get more effective & accurate results. To do that several techniques involving tests and numerical simulation are been used for years. 1D engine simulations (1D CFD

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