

Engine and Auxiliary Systems

Edited by
Prof. Dr. A.K.M. Mohiuddin



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Chapter 11

Investigation of engine performance using designed swirl adapter

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Introduction

The main objective of this work is to investigate the effect of swirl on Proton's CAMPRO Engine Model 1.6 L. The CAMPRO engine is a basic Double Overhead Camshaft (DOHC) which has a capacity of 1597 cc and installed with a total of 16 valves. It is claimed to produce 110 bhp (82 kW) @ 6500 RPM and 148 Nm of torque [1]. Extensive investigation of the swirl effect on CAMPRO engine is performed using GT-Power – a solver of GT-Suite. GT-SUITE is an integrated set of computer-aided engineering (CAE) tools developed by Gamma Technologies, Inc. to address engine and power train design [2]. These tools are contained in a single executable form which is essential to its use in "Integrated Simulations". GT-SUITE comprised of six solvers (GT-Power, GT-Drive, GT-Vtrain, GT-Cool, GT-Fuel, and GT-Crank), a model-building interface (GT-ISE), a powerful post-processing package (GT-POST), and a collection of supporting tools.

Swirl is the rotational flow of charge within the cylinder about its axis (Heinz, 1995). Swirl is usually defined as organized rotation of the charge about the cylinder axis. Swirl is created by bringing the intake flow into the cylinder with an initial angular momentum. There are two general ways of producing swirl during the induction process. Firstly, the flow is discharged into the cylinder tangentially towards the cylinder wall, where it is deflected sideways and downward in a swirling motion. In the other one, the swirl is largely generated within the inlet port: the flow is forced to rotate about the valve axis before it enters the cylinder. The former type of motion is achieved by forcing the flow distribution around the circumference of the inlet valve to be non-uniform, so that the inlet flow has a substantial net angular momentum about the cylinder axis. The directed port and the deflector wall port are two common ways of achieving this result.