Engine and Auxiliary Systems

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

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Chapter 17

Thermodynamic Analysis of Combustion of CAMPRO CFE Engine – Part I: Simulation

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Introduction

The main objective of this part is to perform a simulation analysis of CamPro CFE (Charged Forced Engine) engine to obtain its cylinder pressure data and study the engine losses and its efficiency. The engine is a basic turbocharger engine which has a capacity of 1561cc and installed with a Borg Warner KP39 turbocharger. The bore and stroke dimensions for CamPro CFE are 76 mm and 86 mm respectively. The compression ratio of CamPro CFE is being reduced to 9.5:1 compared to NA CamPro engine.

The engine is being developed by Proton from a naturally aspirated CamPro engine to be a turbocharged engine. This is being done by introducing a turbocharger into the engine system. The 1.6L CamPro CFE engine is expected to meet the performance of a 2.0L natural aspirated engine. Other than introducing the turbocharger component, some improvements have been made to the CamPro engine to accommodate the CamPro CFE engine performance. The engine is expected to meet the torque requirement of 205 Nm at 2000 to 4000 RPM, while the power requirement is expected to be of 103 kW at 5000 rpm.

The virtual engine developed in GT POWER is simulated to gain reference results of its combustion pressure data. The air flow results obtained from the GT POWER is validated using FLUENT simulation software. Then, the actual test is being conducted by using piezoelectric pressure sensor which is known as Kistler plug and the data is being recorded by using an analysis system known as OSIRIS. The combustion pressure data is being used in creating a better CamPro CFE engine model by using simulation software [1].

1.6L CAMPRO CFE Engine

CamPro CFE is a short form of CamPro Charged Forced Engine. The engine is being developed by Proton from a naturally aspirated CamPro engine. This is being done by introducing a turbocharger into the engine system. The 1.6L CamPro CFE engine is expected to