LABORATORY OF INTERNAL COMBUSTION ENGINES

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Description
The Mauá Institute of Technology (IMT) is part of the Engineering Research Center “Prof. Urbano Ernesto Stumpf” (CPE), along with other research institutions of São Paulo state in the project funded by FAPESP (Project 2013-50238-3) together with the PSA - Peugeot Citroen, with the initial goal to study the concept of an advanced ethanol-fueled engine, which explores the specificities and positive characteristics of ethanol as fuel. The CPE is composed also by groups of researchers from the UNICAMP (Campinas State University), the ITA (Aeronautics Institute of Technology), and the EPUSP (Polytechnic School of the São Paulo State University).

The researches in vehicle powertrain adopting biofuels require a comprehensive approach. The topics addressed range from basic research on the phenomenology of the formation and evolution of sprays of ethanol and its combustion, until architectures linking powertrain and vehicle. Tribology, fluid mechanics, thermodynamics, heat transfer, mechanical design of parts and components, noise and vibration analysis, sensors, actuators and control are also themes to be dealt with. These themes are so diverse and simultaneously so interconnected that only an articulated pool of research groups with different skills can carry out the intended goals and face these challenges.

Objectives
To study experimentally the impact of fuel injection systems and air intake designs on performance, emissions and combustion characteristics with different blends of anhydrous ethanol, water and pure gasoline as fuels. To study the impact of exhaust gas recirculation and supercharging with these fuels on PFI and DI engines. In order to achieve these goals, the Division of Engines and Vehicles of the Mauá Institute of Technology (IMT-CP-DMV) will conduct exploratory tests in passenger car engines to be chosen, representing the state-of-the-art of spark-ignition engines. These engines will be modified (when required) to run on ethanol.
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Methodology

The main activities of this research in the IMT consist in tests in a dynamometer bench that will be performed in a base engine modified to run on ethanol, to explore the various possibilities for downsizing and downspeeding. Experimental tests in multi-cylinder engines will also be made, if requested by the other research groups.

Figure 1 shows facilities of the Division of Engines and Vehicles in the IMT to be used by the Engineering Research Center.

Recent publications


