EUROPEAN COMMISSION

Community Research

EUROPEAN RESEARCH 2002

Variable Compression Ratio Technology for CO2 Reduction of Gasoline Engines in Passenger Cars

Project VCR

Crude oil saving and climate gas reduction call for improved combustion engine technologies. Additionally, this new technology must be able to fulfill future emission standards and improved drivability of the vehicles. The "Flexible Combustion Engine" has the potential to realize all the diverging requirements. The "Variable Compression Ratio Technology" (VCR) is an important part of the Flexible Combustion Engine.

The variable compression ratio offers the possibility to run the combustion process efficiency optimal under all load and speed conditions especially in case of high boosted engines with small displacements.

Three car manufacturers, PSA Peugeot Citroen, Volvo and Renault, two powertrain development companies, FEV Motorentechnik and Le Moteur Moderne, and one university, VKA at Aachen University of Technology, research new ways for low cost and high effective VCR technologies.

Three different VCR solutions, the Controlled Crankshaft Positioning – VCR, the Variable Connecting Rod and the Alvar-VCR were manufactured and tested in 1-cylinder engines.

Out of the engine test results depending on the technology used up to 9 % fuel saving can be reached out of running the engine with the optimal compression ratio under all load and speed conditions.

Additional to up 18 % fuel saving can be reached by reducing the engine displacement for about 40 % but keeping torque and performance constant by high boosting. The base for comparison is an engine with 3 L displacement. So, overall a fuel consumption reduction up to 27 % is visible with the new technology without disadvantage in drivability, pollutant emissions and with only moderate production cost increase.

Today two cars with different technologies were under testing at PSA Peugeot Citroen and FEV Motorentechnik. The VCR car of FEV Motorentechnik can be tested on the road outside of the exhibition hall.