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OTTO/DIESEL COMBINED ENGINE -REALIZATION AND CHARACTERISTICS-

ABSTRACT: Multi-process working principle is one of the modern approaches to development of internal combustion engines. By combination of the original features of OTTO and DIESEL working processes, improving of ecological and energy characteristics of the engine can be achieved. Examples of that are spark ignition engines with stratified charge and compression ignition engines with homogeneous charge (HCCI). For the implementation of basic research in this field, experimental Multi-process engine was implemented and its testing methodology was developed. This paper presents the results of the combination of OTTO / DIESEL working processes when the engine is working with both conventional and bio-fuels. Energy and ecological characteristics of engine can be improved by selecting the appropriate working process. Results of initial tests of OTTO / DIESEL engine show a high potential for reducing the particulate emissions. The investigation has shown certain disadvantages of the engine and the ways for their overcoming.

KEYWORDS: compression ratio, efficiency, emission, experimental engine, working process

INTRODUCTION

It is known that the way the engine working process is running has a dominant influence on the engine efficiency and emission. The formation of flammable mixture, its homogeneity and composition, its way of ignition and the course of combustion process, as well as load control mode are the main characteristics of the working process (Table 1). Classical concepts of OTTO and Diesel engines are conditioned by the properties of the used fuel and they have generic advantages and disadvantages. Modern technologies of engine equipment have allowed synthesis of the good features of traditional working processes.

Table 1 *The main characteristics of working processes of modern engines*

		Working process characteristics					
		Mixture forming	**Mixture homogeneity**	**Global Air/Fuel ratio**	**Load regulation by**	**Mixture ignition by**	**Flame propagation**
Working process	**OTTO**	out of cylinder	homogeneous	stoichiom. / rich	throttling	spark	frontal
	DIESEL	in cylinder	inhomogeneous	lean	fuel quantity	compression	diffusion
	GDI	in cylinder	inhomogeneous homogeneous	lean stoichiom. / rich	fuel quantity throttling	spark	diffusion frontal
	HCCI	in/out of cylinder in cylinder	homogeneous inhomogeneous	lean	fuel quantity	compression	simultaneous diffusion

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