

INTERNATIONAL CONFERENCE
St Petersburg, RUSSIA
04 March 20120



«Metrological Support of Innovative Technologies»
ICMSIT-2020

«Regulating characteristics of a diesel engine working on natural gas»

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Problem statement

- One of the basic tasks of any manufacturer nowadays is cutting production costs. The considerable part of agricultural production cost is made up of machine-and-tractor fleet fuel expenditures. The solution to this problem can be found through using cheaper alternative fuel.
- Natural gas is among perspective alternative fuels. Its advantages are evident. Natural gas has low cost .This natural resource is in good supply in the country, gas pipeline system is widespread. There are some challenges with filling and storage of natural gas in auto and tractor facilities but these problems can be coped with.
- In agriculture the types of machinery equipped with diesel engine as a source of power are most commonly used. Though a lot of research on converting diesel engines to natural gas have been carried out, the problem of transition of high performance diesel engines of low dimension is still understudied.

Solution methods

- At the Department of Heat engines, Automobiles and Tractors of the Vyatka State Agricultural Academy the studies on converting diesel engines to natural gas were carried out. Diesel D-245.7 (4CHN11/12.5) equipped with charging and aftercooling systems was taken as the object for the research. By carrying out the gas-diesel process with this engine natural gas is forced into the intake manifold before the turbocharger through gas mixing and metering unit, ignition charge of diesel fuel is admitted through standard fuel system.

Conclusions

Performance indicators of D-245.7 diesel

Operating mode	Θ_{inj}	$p_{z\ max}$, MPa	T_{max} , K	$(dp/d\varphi)_{max}$
Diesel	9°	13.8	2020	0.78
Gas-diesel	7°	14.6	2350	0.93

- 1. When diesel works on a gas-diesel process, the parameters of combustion process and heat release characteristics change as compared to the diesel one. Particularly, the maximum pressure, maximum temperature, and maximum pressure rise rate increase.
- 2. Engine power specifications in a gas-diesel process remain the same as in a diesel one.
- 3. Working on a gas-diesel process, it is necessary to decrease the diesel fuel injection advance angle in order to achieve minimal economical operation and reduce the “harshness” of the combustion process.

Contacts

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