

# FUEL EFFICIENCY OF MOTOR-TRACTOR ENGINES AT DISCONNECTION OF A PART OF CYLINDERS

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**Abstract:** The analysis of indicators of a cycle of working process at shutdown of a part of cylinders on partial modes of operation of the piston engine was carried out. Different options are possible when the fuel supply to these cylinders is stopped and simultaneously the bodies of mechanism of gas distribution and supply of sparks in engines with forced ignition are turned off and there are only deactivating cylinders. When a part of the cylinders is disconnected, the pump losses are reduced, and the ignition and combustion conditions of the fuel–air mixture are improved. In addition, there is an increase in the indicator efficiency due to the reduction of heat losses from the working fluid into the cylinder wall in relation to the full-size engine. The analysis of the work of engines with forced ignition showed that the improvement of fuel efficiency of engines in partial modes is achieved by switching off the part of the cylinders by stopping the fuel supply in them only with the simultaneous impact on the valve timing. For engines with compression ignition, the disconnection of one and two cylinders by stopping the fuel supply in them is accompanied by a deterioration in fuel efficiency, especially in the crankshaft rotation frequency range close to the maximum torque because of a decrease in the indicator efficiency because of a decrease in the excess air coefficient.

**Keywords:** cylinder; shutdown; fuel efficiency; partial modes; excess air; indicator efficiency

**DOI:** 10.30826/CE21140206

## Figure Captions

**Figure 1** Load characteristics of 4Ch10.5/12 diesel engine at the speed of crankshaft  $n = 1500 \text{ min}^{-1}$ : 1 — full-size diesel engine; 2 — one cylinder is disconnected ( $z = 1$ ); 3 — two cylinders are disconnected ( $z = 2$ ); and 4 — air consumption  $G_v$

**Figure 2** Dependence of  $\eta_i/\alpha$  on the excess air coefficient of 4Ch10.5/12 diesel engine in the range of crankshaft speeds 1100–1500  $\text{min}^{-1}$ : 1 —  $n = 1100 \text{ min}^{-1}$ ; 2 — 1300; 3 —  $n = 1500 \text{ min}^{-1}$ ; empty signs — full-size diesel engine; filled grey signs — one cylinder is disconnected ( $z = 1$ ); and filled black signs — two cylinders are disconnected ( $z = 2$ )

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Received May 14, 2021

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