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Research of Factors Affecting the Cylinder-Porshen Group Work Process.

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Annotation. During engine operation, the piston is rubbed against the cylinder wall during forward-reverse motion. Where there is friction, of course, erosion will occur. If we observe the erosion of the cylinder wall, we can see that it is oval eroded. The main reason for this is that the piston oscillates relative to the tip of its finger. Because there is no restriction on the movement of the piston in this direction. As a result, the cylinder is eaten oval, creating a crack that the piston ring is difficult to close.

Keywords: Wall of cylinders; piston ring; bus routes; deformations; effective pressure; mechanical losses.

Introduction. In some scientific articles, the appearance of a crack is written as a result of deformation (Figure 1). That is, the heated sleeve can be easily deformed by the normal force of the piston. Other scientific studies have shown that abrasive particles cause corrosion. If the surface of the cartridge was eaten as a result of abrasive particles, it had to be eaten in the shape of a circle, not an oval. This idea does not mean that abrasive particles have absolutely nothing to do with eating. However, in general, we can consider them as the cause of cracking due to abrasion and deformation under the influence of abrasive particles.

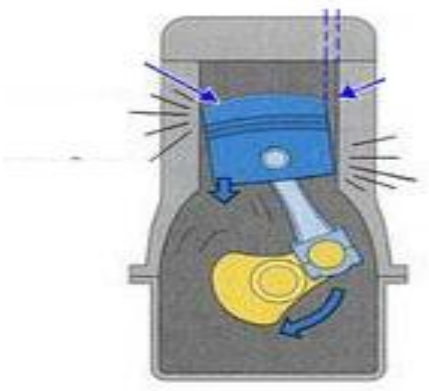

Figure 1. Occurrence of a cylindrical ring crack

Relevance of the topic. If the cylinder wall was eaten uniformly, ie in a circular motion, the effect on engine performance would be minimal. This is because the rings act as a flat spring and are made with a certain pressure epiure. This ensures that the rings touch the gypsum on the circular surfaces [1-2].

When the cylinder wall was eaten uniformly, ie in a circular motion, the effect on engine performance would be minimal. This is because the rings act as a flat spring and are made with a certain pressure diagram. This ensures that the rings touch the gypsum on the circular surfaces.

In addition to the above, cracks can also be caused by deformations during engine assembly. In this case, the cylindrical devoir loses its absolute circular shape.

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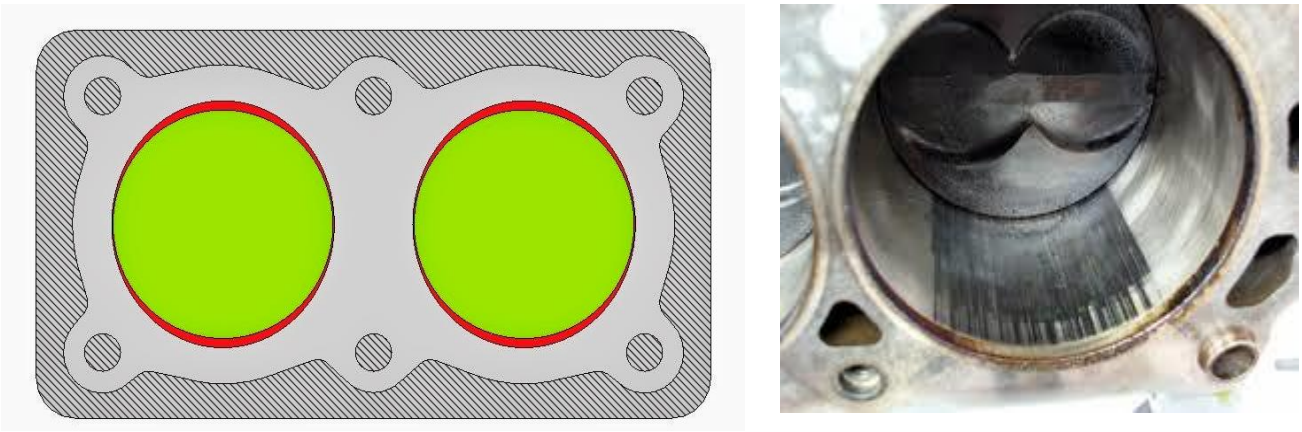

Figure 2. Cylinder-ring groove

Continuous increase of engine power, their use in harsh and high temperature conditions leads to mechanical loading of the cylinder-piston group. This causes burns to form at the bottom of the piston and in the ring grooves, and accelerates the wear of the rings (Fig. 2).

The technical condition of the engine is largely determined by the rings that seal the combustion chamber.

Unless the pressure distribution around the piston ring is prepared to fit the shape of the cylinder, a gap will form between the ring and the cylinder. The presence of a leak leads to a breach of the tightness of the combustion chamber. In engines with leaks, oil burning increases [4-5-6].

The cracks between the piston ring and the cylinder can be checked not in this way, but in the laboratory under the conditions of their location. The presence of cracks in the piston rings loses the tightness of the combustion chamber, resulting in the burning of engine oil in the boat and a decrease in engine performance.

Experimental data show that the oil burn in the engine crankcase when working with a slotted ring is higher than with a slotted ring that operates for 1000 motor hours (Figure 3).

The graph shows that as the cracks in the rings increase (in the cylinder piston group), the loss of tightness in the combustion chamber leads to an increase in the burning of engine oil in the crankcase.

The above data show that the main changes in the tightness of the combustion chamber affect the efficiency of the engine.

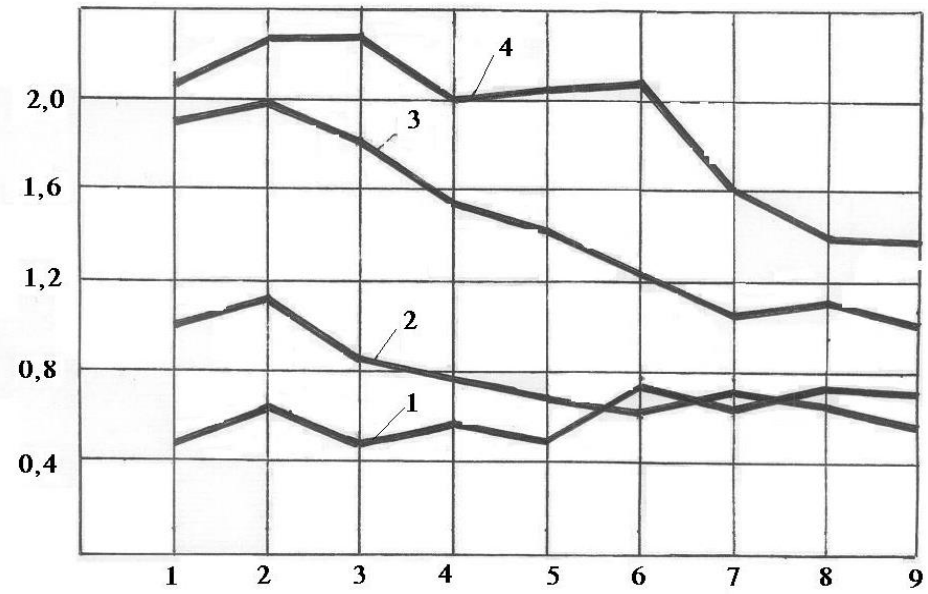

Figure 3. Burning of oil in the crankcase due to cracks in the rings. 1 slitless ring; 2 a ring with a slit in one place; 3 ring with grooves in two places; 4 A ring with three or more grooves.

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Thus, if the indicator pressure in the engine cylinder with a slotted ring is P_i = 0.846MPa, based on the above, this pressure in the engine cylinder with a slotted ring is P_i = 0.81 MPa [8]

In that case

FIK indicator

$$\eta_i = \frac{P_i \cdot \alpha \cdot L_o^1}{Q_н \cdot \rho_к \cdot \eta_v}$$

Specific consumption of fuel indicator:

$$g_i = \frac{3600}{Q_n \cdot \eta_i}$$

Engine efficiency

Average speed of the piston:

$$C_n = \frac{\pi \cdot n_н}{30000}$$

The pressure exerted on the mechanical losses.

$P_m = 0.105 + 0.012 \cdot W_n$

Effective pressure.

$P_e = P_i - P_m$

Mechanical FIK

$$\eta_м = \frac{P_e}{P_i}$$

$\bar{e}_e = \bar{e}_i \cdot \bar{e}_m$

Effective specific cost:

$$g_i = \frac{3600}{Q_n \cdot \eta_i}$$

Hourly fuel consumption:

$G_m = g_e \cdot 10\text{-}3 \cdot Ne$

In this case, the engine power:

$$N_{дв} = \frac{V_h \cdot P_e \cdot n_н \cdot i}{30 \cdot \tau_{дв}}$$

Number of crankshaft revolutions at engine power Ndv = 16.8 kW:

$$n_н = 9550 \frac{N_e}{M_{дв}}$$

It is good that the crack between them is large enough for the piston to move freely in the cylinder, but in terms of the tightness of the combustion chamber, it is good that the crack is as small as possible. These two ideas are a constant problem in engine engineering. A lot of scientific work has been devoted to their solution, but there is still no clear solution to this problem. It is very difficult to determine the optimal amount of clearance because the cylinder and piston will deform under temperature and load during operation. Direct measurement of its size is a complex matter. Moreover, the size of the initial crack between them is determined by their cold state[9-10-11]

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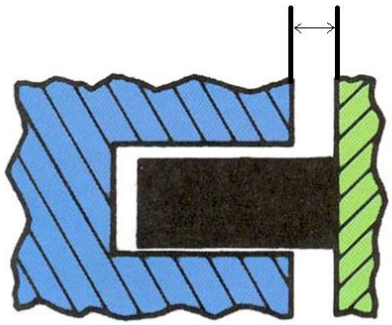

Figure 2.1. The gap between the cylinder and the piston

As a precaution to ensure that the piston does not get stuck between the cylinders, it is marked more than it needs to be measured. The size of the incision is determined for the largest diameter of the piston skirt. As you get to the top of the piston, its diameter decreases, and the stiffness ea of the hole increases. Due to this, the tightness deteriorates, the performance of the first ring deteriorates, and its temperature increases. Therefore, it is important to analyze the design of each engine piston, taking into account the operating conditions, and to develop measures to reduce cylinder-piston leakage [12]. This is because as the crack becomes larger, the crankcase oil burns more. If the gap between the piston skirt and the cylinder is enlarged, the gap between the edge of the piston bottom and the cylinder will increase and the performance of the engine will deteriorate.

The reason for the deterioration of the ring work with the increase of the groove is that the angle of inclination of the piston inside the cylinder is increased. With the deflection of the piston, the swelling of the ring in the groove increases. As a result of bending, firstly, the sizes that ensure the good performance of the ring change, and secondly, the radial surface of the ring does not touch the cylinder walls completely. As a result, under the influence of the pressure of the gases in the combustion chamber, the ring separates from the cylinder walls and a crack is formed between them. It is therefore necessary to minimize the gap between the piston and the cylinder.

Based on the results of the study, the following conclusions can be drawn:

1. In an engine with a grooved ring, the indicator in the cylinder causes the pressure to decrease by an average of 0.07… 0.1 MPa due to the increase in load.

2. It can be observed that the performance of a ring-mounted motor with a groove is lower than that of a used ring. This leads to a slowdown in engine performance.

3. It is advisable to inspect the rings and install the required level of rings on the engine according to the proposed method.

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