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Factors for Stability of Compressed Gas Impermeability in Engine Combustion Chambers

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Abstract: As a result of the combustion process, the total temperature of the combustion is short, with fuels emitting smoke in the atmosphere only 1.0 - 1.5 %. Nonetheless, it is important to stabilize the compression gases in the combustion chambers of the heat engines, especially around their ring-and-ring couplings. The engine's performance is influenced by the pressure and directional pressure, the inertia, and the side pressure of the piston's cylinder wall. The radial direction of the Porshen radiation and the uneven heating of its height create additional internal thermal stress. There is information on the effect that local voltages may be accumulated at the edges of the ring due to the uneven distribution of the metal layer at the bottom and inside of the piston.

Key words: engine combustion chamber, charging air, hermetic, inertia, compressed gas, arc, accumulation, cherry, spark, crack, edges.

Introduction

Conversion of thermal energy into mechanical energy in internal combustion engines is a complex process. Its occurrence in natural conditions is associated with the occurrence of additional losses. The stability of the thermal energy that occurs in the combustion chamber of the engine depends also on how optimally the work is organized on the maintenance of the hermetic pressure of the gases formed during the combustion process of the transferred sideilg'i mixture [15].

Materials and methods

Piston in the cylinder of the air charge compression process in the combustion chamber to Upper Edge Point (U.E.P) we can evaluate the temperature and pressure value in the incoming state using the following analytical expressions [1, 2, 3, 4, 5]:

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$$T_c = T_a \cdot \varepsilon^{n_1-1}; \quad (1)$$

$$P_c = P_a \cdot \varepsilon^{n_1}, \quad (2)$$

here T_a, P_a – side of the cylinder respectivelyilg'i air charge temperature and pressure in front of the inlet; ε – compression coefficient; n_1 – number of adiabata.

(1) and (2) according to the formulas: P_a =0,9 kg/secand T_a = 323℃ change of the indicator n_1 on the borders $T_c$and $P_c$it can lead to a change in their values.As a result of the intensive combustion process, the total temperature change time is low, it is known that the degree of excretion in the form of smoke into the atmosphere with the sideilg'i is only 1,0 – 1,5% in the engines [6, 7, 8, 9]. But despite this, it is important to stabilize the sealability of gases compressed in the combustion chambers of thermal engines, especially around their ring-cherry pairs.

In the process of engine operation, the piston is affected by variable gas pressure, inertia forces and lateral pushing forces of the piston cylinder wall in terms of value and direction. As a result of uneven heating of the piston in the radial direction and at its height, additional internal thermal tension is formed.Because of the uneven distribution of the metal layer on the bottom and inner sides of the piston, local stresses can also accumulate on the edges on which the ring is located.

Pistoners in carburetor and diesel engines are made of aluminum alloys with a coefficient of expansion (16-21)10^{-6} 1/grad. equal, in cylinders of steel or ironis equal to (11-12)10^{-6} 1/grad. This big difference is due to the temperature change in the value of the thermal cracks on the surfaces made of cast iron, the value of the cracks depends on the temperature gradient in the range of them.The choice of the shape and constructive parameters of the piston rings is carried out depending on their functions: gas density in the cavity of the piston ring; depends on the transfer of heat to the walls of the cherry and the rubbing of oil from their walls.

Results and discussions

On the rings of the porshen are used movable elements of the type with a dense bikrian labyrinth. The leakage of gas from them is equal to a narrow value at the limit of 0,5-1,0%.In the case where the piston is standing at the U.E.P, the gas pressure in the cylinder after the ring in the first arc is equal to P, at this time the pressure in the second arc is P_0~0,65P.

1, a-picture schematically shows the forces and pressures acting on the ring the pressure on the top of the piston acts on the back of the ring and squeezes it into the cherry. In the process of processing, the cherry can simply collide with the top and bottom edges, without colliding with the cherry on the entire surface (Picture 1, b).

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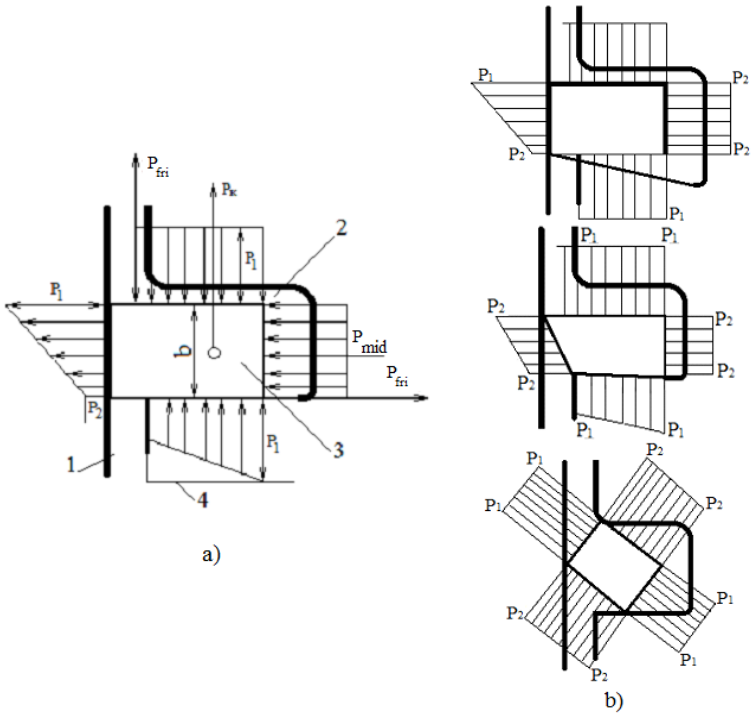

1-ridge; 2-lane; 3-ring; 4-porshen.

Figure 1. The effect of forces on the piston ring (a) and the position of the ring inside the piston ring (b)

Its found its confirmation in the description of the ingestion of the bulk of the ring gases ditches foundation in the process of using such collision.

In high-speed mode, when the piston is at the U.E.P rolling position of the ring, the inertia can be spent at the influence of $P_{1/c}$ (Figure 1, a) and the forces of frictionP_{fric}.This can also be caused by the deformation of the cherry and porshen, the nonperpendicularity of the arc and ring planes on the axis of the cylinder. Compression of gases through the arc to the side of the guiding stem of the piston occurs due to the drosselation in the groove, and the ring is accompanied by a gradual decrease in pressure in the middle of the yellow ring, which is carried away by the tubal. Piston in U.E.P the pressure at the back of the ring at the moment of standing is equal to the pressure P inside the cylinder, and at this time it is equal to P_2~ 0,65-P. In four-stroke engines, the pressure on the back of the ring during discharge and input does not decrease, and residual pressure occurs in it.This kind of accumulation of pressure improves the working ability of the Rings, which partially lost their bikrity. Due to the relative absence of pressure in the cylinder in the plans without full load, the ability of the rings to gasify is reduced, which in the process of use is partially reduced bikrity. Therefore, they are also considered suitable for work, when the Rings reliably retain their ability to condense in their gas description.In case of an increase in the number of rotations of the engine, it is recommended to increase the gas density to the account of

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their ability to reduce the number of compression rings. In existing carburetor engines, it is recommended to reduce the number of compression rings to two, and in diesel to two-three at large pressures.And the limit-eaten cylinder gills can be restored to the size of the repair, while the gills in the gills in the gills are recommended to be repaired by installing rings that are larger than the size of the gills.

In cases where the Rings vibrate in a radial direction, they begin to lag behind the walls of the cherry. As a result of this, the hermetic nature of the inner section of the cylinder does not deteriorate, the heat loss worsens, the local heating area increases, the lubrication quality deteriorates, the Rings begin to bend, and the friction surfaces begin to eat intensively.Cases of vibration in the rings occur when the number of rotations in the engine reaches a certain level, they occur mainly as a result of a decrease in gas pressure in the Rings of the Rings of the piston, which is bent, when irregularities occur in the beehives of the cherry. One of the ways to reduce the vibration in the radical direction of the ring is to increase its bikriness, reduce the size of the piston ditches behind the ring and reduce the height of the ring [10, 11, 12, 13, 14].

The pressure of gases in the slurry significantly increases the compression strength of the rings on the cherry surfaces: as a result, the oil is squeezed out and the friction increases. With an increase in pressure between the ring and the cherry surfaces, a boundary friction occurs on the back of the ring, under the influence of such conditions, especially in the upper ring and the belt of the upper part of the Cherry, the process of ingestion begins to increase.The friction force in the compression rings depends on the average pressure of the gases formed in the piston rings and the height of the ring b (Figure 1, a), since the compression force of the ring under the influence of the gas is proportional to its inner surface (by the arc), that is, $\pi(D - 2t)b$, where t is the P radial. According to their research, in carburetor engines, the distribution of the working volume spent on friction corresponding to the compression rings is as follows: the first ring is 60%, the second 30% and the third 10% (table 1).

Table 1. Basic constructive parameters of piston rings

Rings	$\frac{D}{t}$	b, mm	$\frac{A_0}{t}$
Compression	20 - 25*	2,5 – 5,0*	3,2 - 40*
Oil seedling	23 - 36*		
* the upper limits belong to the diesel			

Mechanical losses for the piston groups on the average pressure in the engine corresponding to the Piston Group reach 50-60 %. The average pressure also has a tendency to increase as the number of engine turns increases. Therefore, for all heat engines, it is

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recommended to reduce the number of compression rings and the height in them to reduce their mechanical losses in friction.

Furthermore, pumps and motors are used to supply water to canals and crops for the economical use of water. In addition, the effective use of water is necessary for water distribution facilities. There is a limited use of water, filtration of water in the canal, a pressure head of a closed irrigation network worked by many scientists in the Republic Uzbekistan [16, 17, 18].

Table 1 lists the numerical values of the main constructive parameters of piston rings in diesel and carburetor engines.

When choosing the main constructive parameters of the Rings, it is recommended to pay attention to the following:

1) the radial slit of the diameter of the cylinder is relatively $\frac{D}{t}$, this value depends on the annular bikrity on the voltage of its solution;

2) ring height b;

3) relative price $\frac{A_0}{t}$, here is the difference in the ability of the ring to be pricked, that is, in the free case of the ring, between the forty and the temperature gap. Professor B. it.On the basis of the theory proposed by Gintsburg, it is possible to determine the average pressure strength of the gas acting on the wall of the porshen arc as follows [4]:

$$P_{mid} = 0.425E \frac{\frac{A_0}{t}}{(3-\xi)\left(\frac{D}{t}-1\right)^3 \frac{D}{t}}, \quad (3)$$

ξ = 0,196 taking into account the value

$$P_{mid} = 0.425E \frac{\frac{A_0}{t}}{\frac{D}{t}\left(\frac{D}{t}-1\right)^3}. \quad (4)$$

here, the elasticity module of the E-ring is for legalized cast iron, E ~1,2 10^5Mn/m^2 ~ 1,2 10^5 kg/sm^2; E – the coefficient of connection of the shape of the EPI of the radial pressure.

Studies have shown that the prevention of vibration condition increases the germicity of the radial pressureP_{mid} of the ring with an increase in the number of motor rotations rorts (Figure 2). With an increase in the height of the ring, the Ring Mass begins to increase under the influence of pressure, due to the increase in the force of inertia, the process of eating porcine slags, friction forces and gills begins to increase.Average radial pressure in konpression rings P_{mid}= 0,11-0,25 Mn/m^2 (1,1 – 2,5 kg/sm^2), sometimes 0,35 Mn/m^2 reached to (3,5 kg/sm^2), in the oil-bearing rings P_{mid} = 0,2 – 0,4 Mn/m^2 (2 – 4 kg/sm^2). The upper limits of P_{mid} belong to small diameter cylinder

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engines:The P_{mid} – pressure in the first compression ring on the side of the combustion chamber should also be at a high level.

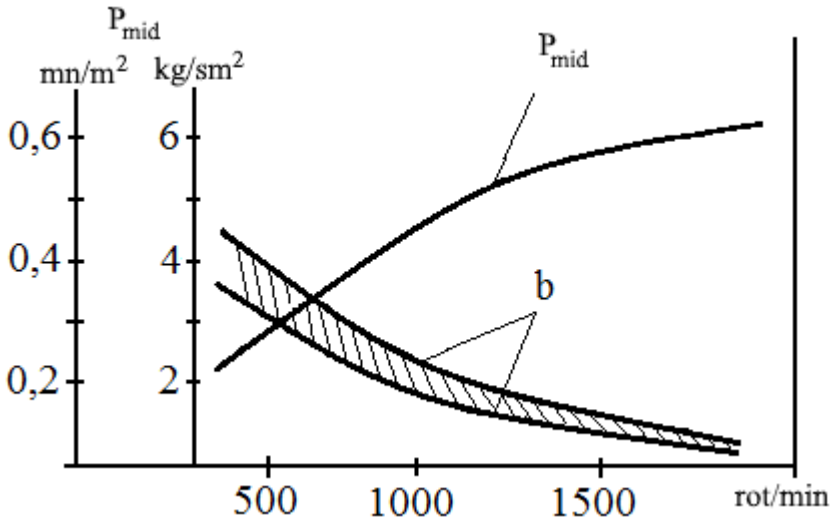

Figure 2. The height of the compression rings depends on the number of turns of the "b" rort change graph of the average radial pressureP_{mid}

We determine the slit value of the piston-mounted ring as follows:

$$\Delta_x = \Delta_x^1 + \left(\alpha_x \cdot \Delta t_x - x_T \Delta t_{\varepsilon_2}\right) \quad (5)$$

here, linear expansion coefficients of α_x and $\alpha_T$in ring and gilding materials; Δt_x – the heating temperature of the ring, Δt_x = 200°C; Δt_r – the heating temperature of the gilding; Δt_r = 140°C for the maximum permissible puncture heated engines in the locks of the Rings, it is recommended to take $\Delta_к$ =0,06-0,1 mm.

The average pressure of gases due to deformation and ingesting of the gills begins to decrease, the efficiency of the germination, especially when the deformation of the Rings corresponds to the deformation of the Gills, this is due to the fact that the rings collide with the gills on the surface, but only with the upper and lower edges. Analytical expressions with quotes porshen in the composition of the working couple to U.E.P at the moment of arrival, it makes it possible to determine the force acting on the ring. As the height of the Rings increases, the tendency of the Rings and gills to increase in the rate of their bending on account of an increase in the friction forces of the bending has been noted, this process can also be ensured by reducing the number of compression rings.

Conclusion

The choice of the constructive parameters of the piston rings for long-term performance depends on their ability to perform their functions. Piston ring has a tendency to cause a decrease in engine power due to the instability of the average pressure in the pair of cylinder blades, partial

leakage of the working compound from the slit between the rings locks. When ensuring the ring-cherry pair is hermetic, it is recommended to choose the appropriate and basic constructive parameters of the ring. It is recommended to take 0,06 – 0,1 mm for engines that heat the maximum allowable torque value in the ring locks. Limit eaten Cherries come in repair size, while ingested porcines are recommended to be repaired by installing enlarged rings in which the plums are scalded. The presented analytical expressions allow to stabilize the hermetic properties of compressed gases in the combustion chambers of the engine and purposefully improve them.

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