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PROBLEMS OF IMPROVING THE TECHNOLOGY OF REPAIRING BLOCKS AND CYLINDER LINERS

Akmal Odinayev
Termiz Institute of Engineering Technology, Senior teacher of "Transport systems and logistics" department

Ro'zimurod Qalandarov
Termiz Institute of Engineering Technology Professor of "Transport systems and logistics" department

Baxtiyor Xolmatov
Termiz Institute of Engineering Technology, Assistant of the "Transport systems and logistics" department

Abstract

The article describes the technology of repair of internal combustion engine block and engine block parts, i.e. defect detection, diagnosis and repair.

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The demand for the supply of spare parts for modern production and agricultural machinery does not satisfy the need. The best way to solve this problem is to repair the damaged parts. Currently, 30-40% of internal combustion engines of cars and tractors, 60-70% of agricultural machines can be repaired by various methods. Along with the improvement of simple methods of repair of details, the use of new effective technological methods is very effective. In this article, we will focus on modern methods of repairing the engine block and bushings.

In most engines, blocks are made of gray and specially alloyed cast iron. The following main defects may appear during their use: cracks, breaks and punctures; damage and corrosion of threads in holes and studs; corrosion of bushings and holes for camshaft bushings; corrosion, ovalization, taper and displacement of the holes in the supports for inserting core bearings; friction of the contact surface of the block head; Corrosion of bores for intermediate gear mounting pins and bushings; Corrosion of the cylinder liners, the upper edges of the housings, and the tores of the surfaces; corrosion of valve seats and valve bushings; Corrosion of cylinder or cylinder liner surfaces, becoming oval, conical, and scraping.

Core bearing housings, camshaft bushing bores, oil channels, and repair-inaccessible areas are broken, as well as when there are more than two cracks between cylinder (liner) bores or valve housings; although the water casings have more than four cracks or more than two cracks passing into machined surfaces; the block is rendered useless when one or more slots intended for compression rings of cylinder liners, the size of the perimeter of which is more than 1/3, are broken.

Cracks, breaks and holes are welded using an electric arc or by patching in a gas flame and they are bolted., welded, patch welded from polymer materials based on epoxy resin. Cracks in places that do not fall under heavy loads are patched by pouring pins or shaped compaction castings.

Corrugated holes large-sized carvings are restored by cutting or casting. Corrugated studs are usually scrapped and sometimes restored by liquid coating and normal or oversize reaming.

Countersunk holes for camshaft bushing (until the threaded bushings are loose) expands to accommodate a repair sized bushing. The bushing holes, the shaft support, are enlarged to match the size of the repair, or the bushing with reduced holes is restored, and the camshaft supports are rotated through these holes.

Locations (slots) of core bearings the patch is repaired by welding, plating or epoxy resin-based compounds to form a coating.

Before liquid coating, the holes are directed to a depth of 1...1.5 mm. Nests are covered by electric welding (using a low-carbon electrode with chalk coating), by using softening rollers, or by welding and liquefying in a gas flame using fluxes FSCh-1 and FSCh-2, using cast iron rods. Cast irons can also be covered by liquidizing them in a gas flame using brass rods. In this case, flux is used and soldered with hard PMTs54 solder (or L-62 brass). Before liquid coating, the core bearing studs are covered with steel sheet housings, the separation planes are covered with copper pads, and the oil transmission planes are covered with asbestos, graphite or copper plugs (to protect them from liquid metal splashing and oil leakage during liquid coating).

Sometimes nests are restored by placing half rings. In this case, the thickness of the half-ring wall of the nests is made from a piece of 1.2...2.0 mm after continuous processing. Semi-rings are made of cast iron close to block cast iron in terms of mechanical properties. The semi-rings are fixed to the block and covers with smooth pins made of mild steel with a diameter of 6...8 mm, which are aligned with the surface of the semi-rings.

The ends of car engine blocks are ironed in flowing electrolyte. Special devices are used that allow to grow all ends of core bearings at the same time.

In tractor and car engine blocks, the main bearing housings are restored with epoxy resin-based compounds. Before applying the composition, the holes are directed to a depth of 0.3...0.6 mm, then down and then down, roughness is created on the surfaces for better contact with the metal. 1.5...2.5 mm thick material is applied, and after it hardens, the leaked material on the parting planes is thoroughly cleaned. The parting planes of the cover are milled, then chamfered to a depth of 0.8...1.2 mm and the covers are installed in the slots, where one 0.05 or 0.10 mm thick gasket is placed under the covers on each side. The cover bolts or nuts are tightened to normal torque and the holes are reamed to normal size. After the holes are widened, the cover is removed, the spillage on the side is cleaned, and the oil channels are cleaned with air.

Some nests are repaired with epoxy resin-based compounds without treatment when eaten or thrown away. Eaten nests are hand-milled with a large-grained flint running on a flexible shaft. The prepared composition is applied with a thickness of at least 1 mm, and a special scale with a diameter equal to the nominal size of the long bearing is placed in all slots. Before placement, a layer of mineral oil is applied to the scale. Non-reversible slots serve to center the scale. The scale is clamped with lids and the content applied to it is waited until it dries, then the lid and the scale are removed, and the spilled content is removed with an ego or a shaver.

The bores for the core bearings of the engine blocks, which are not more than 0.30 mm in the vertical plane and not more than 0.20 mm in the horizontal plane, are restored by shifting the axes of the crankshafts and distribution shafts and expanding them to the nominal size. For this purpose, the parting planes of the main bearing covers are milled and then ground to a depth of 0.5...0.7 mm, they are placed on blocks and fixed with the necessary force by means of bolts or nuts, and the holes are expanded to the nominal size by moving the axes of the shafts.

Checking and testing the block. The engine block is a very complex and responsible body part, and the economic performance and resource of a repaired engine often depends on its technical condition. Therefore, the block is re-inspected after eliminating the defects found during sorting, because the use of welding and other methods to eliminate defects can violate its main geometric parameters. The alignment of the bearing holes in the block, the axiality of the holes for the core screws, the kicking of the grooves made for the cylinder sleeve board, the perpendicularity of the axes of these grooves to the axes of the core bearings are checked, and the block is tested for hermeticity.

Summary in other words, today in agriculture, various districts are enriched with agricultural machines. Today, there is a need to use agricultural equipment for tillage, sowing, fertilizing, spraying, and harvesting equipment from Germany, the USA, Russia, China and other countries, and to supply them with spare parts when necessary. Of course, it is very expensive to bring these spare parts from abroad in foreign currency. Therefore, it is more economical to prepare and repair some of the details of the equipment and equipment available in the technical service centers located in the regions and districts.

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