ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 8, Issue 5 , May 2021

Selection of Rational Form of Working Bodies of Digging Machines

Ruzibaev Alisher Narkulovich, Islomova Mokhichehra Khasanovna, O'rozovAkobirAbdunazar o'g'li,NuriddinovSur'atZavqiddin o'g'li

Docent of the department Mechanical engineering,Navoi state mining institute, Uzbekistan
Student of the department Mechanical engineering, Navoi state mining institute, Uzbekistan
Student of the department Mechanical engineering, Navoi state mining institute, Uzbekistan
Student of the department Mechanical engineering, Navoi state mining institute, Uzbekistan

ABSTRACT: This article discusses the choice of a rational form of working bodies of earth-moving machines. A requirement is proposed for the bucket teeth to change them in configuration and size. The features of the working conditions of earth-moving machines and methods of increasing the wear resistance of cutting bodies are considered. Specific recommendations for reducing the wear of excavator bucket teeth are given.

KEYWORDS: Wear resistance, increase, wear, earth-moving machine, cutting part, shape, tooth, bucket, excavator.

I. INTRODUCTION

In the process of operation of earth-moving machines, most of the energy is spent on cutting the soil and filling the working body with it. Therefore, reducing the energy consumption of cutting and, in general, digging the soil by improving the design of the working bodies is an urgent problem aimed at increasing the productivity and durability of earth-moving machines. Analysis of the development of earth-moving machines and, in particular, the analysis of patent materials, shows the following main trends in the development of working bodies: an increase in their size and capacity, respectively, an increase in the power of machines, an increase in rigidity, reliability and durability due to the rational choice of shape and materials with process features interaction with soil, application of devices and new physical methods that intensify soil destruction. An increase in the operating speeds of machines, a decrease in their metal consumption and an increase in durability are inextricably linked with the shape of the working bodies, on which the quality of the performed technological process depends. Nowadays, blade-shaped working bodies are widely used, the cutting edge of which is wedge-shaped. This form in the soil conditions of Central Asia does not always meet the requirements of the operators in terms of wear resistance and strength. It has been established that the resource of the blade-shaped teeth reaches the limiting state in 50-60 hours of operation in gravel-sandy soils, while the length of the working part decreases by 50-65% of the design, and in some cases in 2.5-4, 0 times. It can be said without exaggeration that, unfortunately, there are still no earthmoving machines that are quite simple, convenient and durable; they exist only in living nature. Here, if you look closely, you can see more than one "earth-moving machine" brought in the process of evolution after centuries of selection to the highest degree of perfection. These living "earth-moving machines" are now the object of study [1].

II. METODOLOGY

There is still no consensus on the appropriate shape of the cutting edge and the arrangement of the bucket teeth, especially for the development of dense and highly abrasive soils. We must strive to create working bodies that could adapt to various operating conditions [2].

A very effective "wedge", pointed to the bottom and expanding to the top is a stake, a piece of wood or iron used for splitting, splitting the material. First of all, such a characteristic as sharpening is important to us. The wedge has one more, perhaps the main and remarkable property, the ability to decompose the axial force applied to it into its components. The sharper the angle of the wedge, the more the splitting force is obtained, and many times over, but it is impossible to sharpen the wedge strongly, since it becomes fragile, so you have to choose a rational angle of sharpening, taking into account the strength of the materials and the purpose of the tools.

Let's say that we have chosen a rational angle of the wedge, and then we started processing with such a cutter. We will immediately face the difficulties associated with the installation of the wedge-cutter relative to the work surface, since

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 8, Issue 5 , May 2021

chip removal will not be effective in any of its positions.
When the axis of the wedge is tilted in the direction of its movement, mainly crushing, smoothing, indentation will be carried out; the cutting process will become normal and facilitated if the wedge of the cutter is positioned relative to the machined surface with an inclination of the axis in the opposite direction. In this case, the chips will abut and come off the so-called front surface of the cutter wedge, while its other surface, facing the already processed surface, the rear surface, should not, for the most part, come into contact with the processed surface and cause excessive friction, heating and its deformation.

III. SYSTEM ANALYSIS

The front and rear surfaces of the same wedge during cutting have functionally different purposes, they are inherent in all tools without exception and, intersecting with each other, form a cutting edge. In addition, the front and back surfaces of the wedge-cutter should be quite definite and rational angles in relation to the surface to be machined. Tool breakage, unlike its wear, is not considered a natural event, but rather exceptional, otherwise all cutters would have to break. And wear is quite a natural phenomenon, even for tool materials of high hardness to strength.
In the process of cutting, the tool wears out, worn areas appear on the working surfaces of the wedge, they can be on the front or rear surfaces of the cutter, as well as on both surfaces at the same time. Wear depends on the cutting conditions, the properties of the material being processed and the tool itself, it is harmful, since it reduces the service life of cutting tools, leads to a loss of processing quality, machine downtime, an increase in fuel consumption, a decrease in productivity, so wear is constantly being reduced by using new materials , efficient media, more rational cutter geometry, etc.
Why the fangs, incisors and claws of animals are sharp all the time, after all, when they wear off, they should become dull. However, they not only remain sharp, but do not even change the angle of the cutter wedge. This is due to the difference in hardness and wear resistance of the outer and inner sides of the tooth wedge. The less hard inner side of the tooth wears out faster than the harder outer side, which is why a sharp wedge is formed with an effective angle of sharpening found by nature, therefore animals are not afraid to blunt their incisors, canines, claws, teeth [3].
The efficiency of loosening and excavation of the soil by rodents was assessed in terms of the ratio of their mass to the soil thrown out of the course, the length of the strokes and the methods of digging.
Comparison of the values obtained in the soil channel of the horizontal component when working with different types of teeth shows that in the case of digging with curved teeth, cutting decreases 1.6-1.9 times, depending on the depth of digging. A decrease in the resistance to digging when working with a curved tooth is explained by a more concentrated digging force and a large specific pressure on the cutting edge, its better streamlining compared to the edge of a rectangular section, the implementation of continuous sticking and oblique cutting with the cutting edge. Replacement of wedge-shaped teeth with curved ones in highly abrasive soils led to an increase in cutting performance by 16-21%.
In connection with the considered data, it is of interest to compare the performance of the EO-4121 excavator with the “performance” of the mole vole. In an hour, the mole vole threw out soil 95-100 times more than its mass, with its own height of about 6 cm and a weight of 193 grams. It can lift a load 30-45 times greater than the weight of a mole vole to a height of 10 cm. Thus, a mole vole is 32-40 times more "productive" than an excavator.
The introduction of research results can have a significant economic effect, which consists of a reduction in the cost of soil development, the cost of cutting elements and the cost of fuel and energy resources through the use of rational and efficient designs of working bodies.

REFERENCES

1. Temnov V.G. Constructive systems in nature and construction equipment. Leningrad, Stroyizdat. 1987 .-- 256s.
2. Silin A.A. Friction and us. Moscow. The science. 1987 .-- 192s.
3. Gambaryan P.P. Adaptive features of the organs of movement of burrowing mammals. AN Arm.SSR, 1968 .-- 434p.