

ANALYSIS OF OPERATING CONDITIONS ENGINEERING MACHINES **Shukurov N.R. (Republic of Uzbekistan) Email: Shukurov457@scientifictext.ru**

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Abstract: when performing engineering tasks for the development of soil, wheeled excavators-loaders are widely used in various sectors of the national economy associated with the construction of road, transport, water management, hydraulic engineering, land reclamation, industrial and civil facilities. This requires a constant search for new solutions aimed at improving the efficiency of the use of these machines.

The article presents the results of statistical analyzes of the development of soil by engineering (earth-moving and earth-moving) machines when performing earthworks. The data on the distribution of the probabilities of the appearance of various soils developed by these machines are presented.

Keywords: earth-moving vehicles, wheel excavator-loaders, soil environment, length of the road, energy intensity of soil cutting.

АНАЛИЗ УСЛОВИЙ ЭКСПЛУАТАЦИИ ИНЖЕНЕРНЫХ МАШИН **Шукуров Н.Р. (Республика Узбекистан)**

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Аннотация: при выполнении инженерных задач по разработке грунтов колесные экскаваторы-погрузчики находят широкое применение в самых различных отраслях народного хозяйства, связанных со строительством дорожных, транспортных, водохозяйственных, гидротехнических, мелиоративных, промышленных и гражданских объектов. Это требует постоянного поиска новых решений, направленных на повышение эффективности использования этих машин.

В статье приведены результаты статистических анализов разработки грунтов инженерными (землеройными и землеройно-транспортными) машинами при выполнении земляных работ. Приведены данные по распределению вероятностей появления различных грунтов, разрабатываемых этими машинами.

Ключевые слова: землеройно-транспортные машины, колесные экскаваторы-погрузчики, грунтовая среда, протяженность дороги, энергоемкость резания грунта.

Currently, when performing earthworks, in addition to military engineering purposes, wheeled excavators-loaders are increasingly used in various sectors of the national economy associated with the construction of road, transport, water management, hydraulic engineering, land reclamation, industrial, civil and agricultural facilities. This requires a constant search for new solutions aimed at improving the efficiency of the use of these machines.

Wheel excavator-loaders, which have a fairly compact size and high maneuverability, are simply irreplaceable on small construction sites, in a dense urban development.

In recent years, the volume of construction work has sharply increased in the republic, where the share of the participation of loading machines has also increased. So, here the percentage of use of wheel excavators loaders falls on quarrying – 0,41, in warehouses – 0,33, at industrial construction sites – 0,18 and in transport construction – 0,08 [1].

The use of wheel excavator loaders is based on the annual operating mode of the machine, which is determined on the average listed machine for specific operating conditions, taking into account the construction area, location of facilities, capacity and location of the repair base, as well as the operational characteristics of certain types of machines and the type of work performed. When calculating the annual regime, only such breaks in the operation of the machine are taken into account, which take the whole shift or the whole day: holidays and weekends; interruptions associated with relocation of the machine, downtime due to unfavorable weather conditions, time for maintenance and repairs, unforeseen downtime for organizational reasons.

Recently, there has been a trend towards using wheel excavator loaders in earthworks, which include:
layer-by-layer development of soils up to category III;
loading soil into vehicles;
transportation of the excavated soil into the bucket and with its unloading into the dump;
layout of sites and their compaction;

backfilling of trenches, etc.

The use of these machines in earthworks will become more widespread with the advent of wheeled backhoe loaders with buckets of 3–7,5 m³ capacity. These machines, being heavy-duty and possessing high traction and coupling qualities, can successfully compete with single-bucket front-end pneumatic wheel loaders, scrapers, bulldozers and other earth-moving machines.

When developing new designs of construction and road machines, and wheel excavator-loaders, in particular, the determination of the main technical parameters depending on the operating conditions is an important factor in improving the quality and efficiency of machines. Moreover, it is necessary to observe that the parameters of the machines correspond to the most probable conditions in which they will be operated.

For earth-moving machines, the main factors that determine the operating conditions are: strength properties and condition of the soil, types and volumes of work, range of movement of the soil and a number of other factors. Knowledge of the statistical models of the distribution of soil types, their moisture content and strength properties across the territory of the republic, taking into account climatic zoning, will make it possible to develop more substantiated methods for calculating machine parameters, such as the bucket capacity, and its design dimensions, engine power, travel speed, etc.

The soil environment affects the operation of the machine through the running system and the resistance of the working body to movement. When using a wheel excavator-loader in earthworks, its interaction with the soil is associated with overcoming the resistances arising from the introduction, digging and transportation of the soil.

In order to identify the extent of distribution of the most probable soils, as well as their mechanical properties on the territory of the Commonwealth of Independent States (CIS), an analysis of materials on soil science and soil science was carried out [2].

Statistical material was classified by soil type. As a result of statistical analysis, the probabilities of the appearance of surface soils on the territory of the CIS were calculated, with the exception of areas that are not objects of mass construction (glacial, arctic, alpine, etc.) and permafrost.

The results of the analysis of statistical materials showed that loamy and clayey soils dominate on the territory of the CIS, the probability of which is 0,534, including in the territory occupied by non-permafrost soils – 0,411 and permafrost – 0,774. Consequently, the running systems of earth-moving vehicles on the territory of the CIS (with the exception of mountainous regions) will operate in conditions of loamy and clayey soils with a probability of 0,456, and for the II soil-geographical zone – 0,313.

The presented material mainly reflects the upper soil layer of the soil massif and gives, in the first approximation, a qualitative characteristic of its distribution.

To obtain clearer quantitative indicators that determine the strength properties of rocks, as well as other factors characterizing the operating conditions of earth-moving machines (climate, terrain, precipitation, etc.), taking into account the likely nature of their occurrence.

Natural and climatic conditions of Central Asia, in particular, our republic with an area of 447,4 thousand square meters. km are characterized by aridity and continentality. The features of the climate of this territory are:

high insolation and low humidity;

short winters and hot long summers (up to + 480C), the number of days with temperatures above 0°C per year - from 180 to 295 days;

low amount of precipitation (from 47 to 480 mm) per year.

The terrain is often flat and slightly hilly, less often foothills and mountains. The seismicity of the region is 5 ÷ 8 points. Freezing depth – 0,3 ÷ 2,0 m.

Statistical materials collected from the design and technical documentation of the republic's road construction projects served as the initial data for the statistical analysis of the operating conditions of machines for earthworks. As a result of processing the statistical material, it was found that bulldozers have the highest probability of performing earthworks in terms of volume, 0,439 for motor graders, 0,078 for motor graders, 0,141 for scrapers, and 0,342 for a wheel excavator loader.

Bringing the initial values of indicators is determined by dividing them by the length of the road. The process of reducing indicators is performed for random values. This is due to the fact that the very process of choosing the length of a certain road construction is random, depending on factors such as the location of terminal and other settlements along the route, the terrain, territorial subordination, and the like.

A relatively large share of work in terms of volume, attributable to a wheel excavator-loader, is explained by the fact that in the republic, where it is expedient, the construction of highways is practiced using roadside unpaved and other quarries, and not the construction of an earth bed using fertile lands, along road under construction. In this regard, a great prospect opens up for the use of mobile and high-performance wheeled backhoe loaders of medium and larger power instead of heavy and crawler excavators.

Analysis of statistical material on road objects revealed the probability distribution of different types of soil development in the following values: for loam – 0,301, sandy loam – 0,225, sand – 0,211, clay – 0,128, gravelly and crushed stone – 0,083, rocky – 0,052.

The given values indicate that the most probable soils on the territory of Uzbekistan are soils containing sand particles in different quantities: loam, sandy loam and sand.

Thus, the use of wheel excavator loaders in earthworks is more efficient, in certain conditions, compared to other earthmoving and earthmoving machines. The expansion of the field of use of these machines is achieved due to their versatility and the possibility of using various replaceable working bodies.

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