JOURNAL OF INTELLECTUAL PRPERTY AND HUMAN RIGHTS

Volume: 01 Issue: 01 | 2022
ISSN: 2720-6882
www.academiczone.net

Practical Research On Excavators Used In The Construction And Reconstruction Of Open Collector-Ditches

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Abstract

In This article presents the results and theoretical basis of research on the selection and grouping of single-bucket hydraulic excavators that work most effectively in accordance with their hydraulic parameters in the cleaning and repair of existing open drainage collectors. Based on the developed recommendations, students studying in water management organizations and relevant higher education institutions can use it as a primary resource.

Keywords: drip grader, excavator manufacturer, speed, tensile strength, soil size, leveling quality. water saving, furrow irrigation, innovative technologies, the mechanic.

INTRODUCTION

In order to verify the results of theoretical research and compare the parameters of the excavator in accordance with the hydraulic parameters of the collector-trenches, the following were included in the program of practical research:

- Identification of factors affecting the productivity of excavators in the excavation and reconstruction of collector-ditches;
- Carrying out of control and observation experiments on a work object by means of a chronometric method and collection of results;
- Excavator based on the method of mathematical modulation of experimental results determine the optimal options for the parameters corresponding to the hydraulic parameters of the collector-drains.

Excavator productivity methodology of study at the work site. In the study of work productivity at the work site to determine the work efficiency of excavators in accordance with the interstate standard GOST 30067-93 "Methods for checking the technically achievable working cycle duration,

Volume: 01 Issue: 01 | 2022
ISSN: 2720-6882
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maximum productivity and minimum specific fuel consumption" in Annex 12 .

1.These indications are used to confirm the data of technical specifications of specific excavator models.

2. The indicators are checked in accordance with the following conditions:

- air temperature - 10 °S and 25 °S each;
- weather - without precipitation;
- engine adjustment - for maximum fuel transmission or as recommended in the PTD of the excavator manufacturer;
- heating of the working fluid in the hydraulic system - plus (50±10) ° C each;
- Qualified maintenance and management of the excavator.

3. Performance checks are performed for the main types of equipment in the following types of work:

for excavators with reverse bucket - trenching of category III soils at a depth of not more than 2/3 of the maximum kinematic excavation depth, but 2.5 m for excavators of size 3 group and 3.0 m for excavators of size group 4-6 and overturning work in a width not exceeding twice the width of the bucket;

The methodology and test conditions for testing the technically achievable performance of other types of excavators with working equipment and working bodies, as well as the performance of excavators with enlarged base surfaces shall be determined in the test methodology and program of the exact model.

4. The duration of the work cycle is defined as the arithmetic mean value of the bucket filling factor measured at least ten times the operating time at an angle of rotation of at least 1.57 rad (90 °).

5. The technical performance is calculated based on the actual data on the cycle duration indicated during the test to check the duration of the working cycle, the coefficients of filling the bucket and the softening of the soil.

6. To determine the minimum specific fuel consumption, the excavator determines the productivity based on the volume of soil worked in a trench or working volume for 30 minutes of continuous work (including the time required to move and prepare the excavation). It is allowed to determine the volume of the soil by the number of buckets, taking into account the filling coefficients of the bucket and the softening coefficients of the soil.

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ISSN: 2720-6882
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MAIN PART

As a result of the work, the arithmetic mean values of the results of each of the three tests performed on a single machine for 30 minutes with a qualified machinist are accepted.

In this case, the fuel consumption should be determined using a measured tank and a fixed meter (the amount of fuel in the tank should be measured before the test) or by weighing [15,13,11,14].

Procedure of research. Using the above methodology, the timing method was selected to determine the work efficiency of excavators at the work site. [4] according to the interstate standard GOST 30067-93 "Chronometry sheet" (Appendix 1), given in Annex 10 to the literature, the productivity of excavators was determined.

The results of applied research to determine the productivity of work by the method of timing.

For timing, the length of the trench was selected and compared with the time taken to cover this distance, productivity, number of cycles, the average filling coefficient of the bucket and the distance of excavation and pouring of the soil, as well as fuel consumption. The results of the research were summed up by 3 repeated measurements on the total length of 34 km of the "Central Bukhara drainage system" in Bukhara district, 100 km in the "Parallel system" and 100 km of the "Kungrad system" in Kagan district.

The studies were conducted on 3 types of excavators (Figure 3.1). These are:

1. JYYANG JY-623 E excavator
2. GLG from LIUGONG 205C model excavator
3. XE-215CLL excavator of Khorezm excavator plant

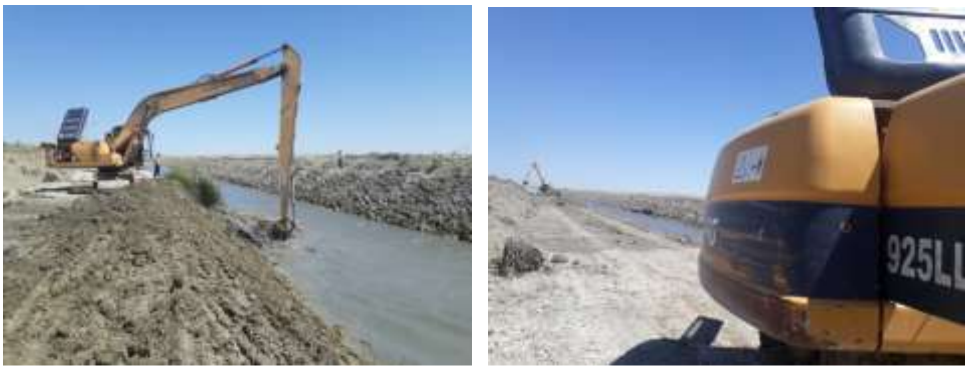

Fig. 1. ***Excavators at the work sites on the collector-ditches are timed***

The overall technical parameters of all three excavators are close to each other, engine power is 108 (145) kW (hp), maximum excavation depth is 6.35 m, maximum pouring height is 6.73 m, bucket

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ISSN: 2720-6882
www.academiczone.net

capacity is 0.65 m^3, chain hoisting equipment hydraulic excavators were studied. Ground type-gravel sand-mud.

Results of research

The average values of the chronometric results are given in the table below.
Table 1

Results determined and calculated by timing

Indicators	JY-623 ELB	GLG 205C	XE-215CLL
Average time spent cleaning, p	846	801	796
Working productivity, m^3 / hour	84	76.2	96
Number of work cycles, pcs	34	32	36
The average filling coefficient of the bucket	0.89	0.82	0.91
Soil excavation radius, m	5.3	5.2	5.1
Soil shedding radius, m	3.1	2.9	3.2
Fuel consumption, l / h	14.7	14.6	14.1

It can be seen from Table 1 that the practical results identified in the studied excavators are changing in accordance with the theoretical results. At the same time, the XE-215CLL excavator is more efficient in the region, ie the XE-215CLL excavator is more efficient. The JY-623 has an efficiency of 12 m^3 / h compared to the ELB excavator, and the GLG 205C has an efficiency of 20 m^3 / h compared to the ELB excavator. The number of work cycles per unit was 2 times higher than the JY-623 ELB excavator and 4 times higher than the GLG 205C ELB excavator, and the fuel consumption was 0.5 ... 0.6 liters / hour compared to both excavators.

CONCLUSION

Based on the technical parameters of the proposed excavators, cost-effectiveness can be achieved by increasing the work efficiency when selected in accordance with the hydraulic parameters of the collector-ditches.

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