MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

KYIV NATIONAL UNIVERSITY OF CONSTRUCTION AND ARCHITECTURE

PAN

POLISH ACADEMY OF SCIENCES (KYIV OFFICE)

WORKING PROGRAM AND PROCEEDINGS

INTERNATIONAL
SCIENTIFIC – PRACTICAL CONFERENCE
OF YOUNG SCIENTISTS

«BUILD-MASTER-CLASS-2017»

BUILD
MASTER
CLASS 2017

28.11-01.12.2017
In Kyiv National University of Construction and Architecture

Ukraine, Kyiv, Povitroflotskyi av. 31

SECTION 5.

Construction vehicles and equipment

1[st] of Desember, 2017, aud. 207

10:00 – Sectional meeting
14:00 – Lunch
15:00 – Second plenary meeting

1. Delemborskyi M., Assistant (KNUCA)
METHODS OF INCREASING THE RELIABILITY AND EFFICIENCY OF VIRTUAL SURFACES OF BUILD INDUSTRY

2. Palamarchuk D., PhD, Associate Professor (KNUCA); Moroz O., Student (KNUCA)
BELT CONVEYOR WITH AUTOMATIC POWER CONTROL SYSTEM

√ *3. Nyezhentsev O., PhD, Associate Professor (NTUU «Igor Sikorsky KPI»); Tanich H., Student (NTUU «Igor Sikorsky KPI»)*
DYNAMIC LOADS WHEN LIFTING CARGO BY BRIDGE CRANES DURING BRAKING

4. Diachenko O. graduate Student (KNUCA)
REVIEW AND ANALYSIS OF VIBRATING EQUIPMENT FOR THE FORMATION OF FLAT REINFORCED CONCRETE PRODUCTS

5. Pristyle M., PhD, Associate Professor (KNUCA); Marchuk K., Postgraduate (KNUCA); Koval E., Student (KNUCA)
REVIEW OF EXISTING DESIGNS OF SINGLE-HULL UNIVERSAL EXCAVATORS

6. Abrashkevich Y., PhD, Professor (KNUCA); Tishkovets V., postgraduate (KNUCA)
INVESTIGATION OF THE ABILITY OF ABRASIVE ARMED CIRCUITS

7. Bolilyi B., Postgraduate (KNUCA); Korniychuk B., PhD, Associate Professor (KNUCA)
EVALUATION OF EXISTING EQUIPMENT FOR THE FORMATION OF TUBULAR ELEMENTS

√ *8. Nyezhentsev O., PhD, Associate Professor (NTUU «Igor Sikorsky KPI»); Tereshchenko K., Student (NTUU «Igor Sikorsky KPI»)*
CHOICE OF OPTIMAL PARAMETERS FOR MECHANISM OF MOVEMENT OF THE BRIDGE CRANE

electromagnetic actuator without smooth control of speed. In conveyors of high power control of the electric motor carries a thyristor converter. Such a system allows you to control the rotational speed of the motor shaft within 500...1000 rpm. Thyristor control does not allow for frequent switching on / off of the electric motor. In addition, such a control system imposes restrictions on the nature of the transient processes during overclocking, braking, switching, and does not allow for a smooth change in the rotational speed of the motor shaft.

Therefore, for controlling the drive of the conveyor belt, an adaptive power control system is proposed for the electric motor. The basis of this system is a frequency changer. Such a control system has a system of conveyor belt conveyor sensors, an analog-to-digital converter (ADC), a microcontroller input processing device, a frequency changer and an electric motor of the conveyor drive.

Modern frequency changers allow you to smoothly change the speed of the motor shaft within 1...800%. In addition, frequency converters allow programmable control of the motor by the prescribed laws.

The system works as follows. During the operation of the conveyor, the sensor system collects information about the tension of the belt and the conveyor load. The received data is transmitted to the ADC and processed. After that, the array of processed data is transferred to the controlling microcontroller device that controls the frequency changer. According to the received data, the frequency changer changes the frequency of rotation of the shaft of the drive motor.

Such a system works in real time. The use of this control system avoids overloading the conveyor belt, which increases the runtime of the belt until it is replaced. In addition, the power control of the electric motor can reduce the energy consumption of the conveyor.

UDC 621.873(043.2)

Nyezhentsev O., PhD, Associate Professor (NTUU «Igor Sikorsky KPI»);
Tanich H., Student (NTUU «Igor Sikorsky KPI»)

DYNAMIC LOADS WHEN LIFTING CARGO BY BRIDGE CRANES DURING BRAKING

The maximum dynamic efforts in the ropes and in the bridge crane's metal structures are usually determined when lifting of cargo with a «jerk». In this case, three stages are considered: 1) choice backlash in the drive and the rope slack; 2) change of efforts in the rope from zero to a value equal to the weight of the cargo; 3) lifting of cargo. But our studies have shown that in some cases the maximum dynamic loads in the ropes and the crane's metal structures occur during the period of braking at the lifting cargo (in the fourth stage).

In this work influence of various factors on dynamic loads in ropes and crane metal structures during braking at lifting cargo is analyzed. To do this, we used a mathematical model of a bridge crane, represented by the calculation's three-mass scheme.

The analysis of transients on the example of a bridge crane with a payload of 10 tons showed that the dynamic coefficients in the rope K_k and in the metal structures of the crane K_m depend on the mechanical characteristics of the engin which carries out the lifting of the cargo. With the increase in the ordinal number the mechanical characteristic, the difference between the dynamic coefficien calculated at the 3rd and 4th stages increases. If during the lifting of the cargo on th 1st characteristic the coefficient K_k is 1.53 at the 3rd stage and 1.67 at the 4th stag then the coefficient K_k is equal to 1.56 and 1, 96 when lifting of the cargo on the 6t characteristic, respectively. The dynamic coefficient K_m varies in a similar way an assumes values for the lifting of the cargo on the 1st characteristic of 1.39 and 1.47 and for on the 6th characteristic, respectively, 1.35 and 1.59.

In addition, the values of the dynamic coefficients K_k and K_m depend on th height at which the cargo rises. At low values of the lifting height (up to 0.15 m), th dynamic coefficients K_k and K_m in the 4th stage exceed the corresponding coefficient of the 3rd stage to 21%. As the height increases, the differences between the dynamic coefficients in the 3rd and 4th stages decrease. Therefore, the desire of crane operators to reduce dynamic loads in ropes and in the crane's metal structure by stopping cargo at low altitude can lead to the opposite effect, that is, to increase them by 6-21%.

In this work, recommendations are given to reduce dynamic loads in ropes and the metal structure of a bridge crane when lifting cargo.

UDC 667.1(043.2)

Diachenko O. graduate Student (KNUCA)

REVIEW AND ANALYSIS OF VIBRATING EQUIPMENT FOR THE FORMATION OF FLAT REINFORCED CONCRETE PRODUCTS

In the manufacture of reinforced concrete products, factories of reinforced concrete structures need to perform important operations of the compaction and formation of concrete mixes, to provide the product the desired configuration, to obtain the required density, which in the finished product should affect the strength, water resistance, frost resistance and ensure the quality of the surfaces.

Of all the methods of compacting and forming the largest distribution at the factories of the construction industry received a bench method of volume vibration compaction of concrete products. In this method of production using vibratory compaction platforms or vibrational forming installations. With the influence of mechanical vibrations on a cement-concrete mixture, latter goes into a state of high fluidity, resulting in greatly reduced of viscous resistance forces and there is a process of convergence and displacement of air particles by the gravity and dynamic forces, and as a result increases the density of the concrete mix, and decreases its porosity.

In the work was review and analysis of the vibration platforms of frame and block constructions, used at the factories of reinforced concrete structures for the formation of flat reinforced concrete products was performed. Was done comparative analysis of their constructive and technological parameters according to the criteria of energy intensity, energy intensity on a compacting and metal capacity, and determined the most effective designs.