~~5. Клюев В.В., Соснин Ф.Р., Филинов В.Н. и др. / Под ред. В.В.Клюева. Неразрушающий контроль и диагностика: Справочник. – М.: Машиностроение, 1995. - 448 с.~~

In Article pryvedenы Results Study Implementation raznыh of opportunities for PSI nature sposobov and non-destructive inspection methods when s Choice for эffektyvnoho Identify major defects and povrezhdenyy to obtain adekvatnыh indicators in malfunction and dyahnostyrovanyy agricultural machines.

Malfunction, dyahnostyrovanye, defektы, INJURIOUS, parts, Machines, Methods, Methods, Implementation, Identify.

~~Вероятностные характеристики выбора методов неразрушающего контроля~~

~~РЕЗЮМЕ. В статье приведены результаты определения вероятностных характеристик выбора методов неразрушающего контроля деталей сельскохозяйственных машин при определении основных дефектов, которые имеют эти детали.~~

There are presented results over of study of marketabilities of different on the nature methods of non-destructive control are brought for the effective exposure of basic defects and damages at their choice for the receipt of adequate indexes at defect finding and diagnosticating of agricultural machines in the article.

Defect finding, diagnosticating, defects, damages, details, machines, methods, realization, exposure.

~~Probabilistic descriptions of choice of methods of nondestructive control~~

~~SUMMARY. In the article the results of determination of probabilistic descriptions of choice of methods of nondestructive control of parts of agricultural machines at determination of basic defects which have these parts are resulted~~

UDC 621,873

Dynamic analysis of the crane-SHTABELERAZ VIEW OF MECHANICAL SPECIFICATIONS ENGINE

VS Loveykin, PhD

Отформатировано: Шрифт: (по умолчанию) Arial, полужирный, курсив, Цвет шрифта: Текст 1

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The work carried out dynamic analysis of the crane Stacking. The task solved by numerical integration of differential equations of the crane-stacker. The results are illustrated graphs that characterize the process of acceleration column Stacker crane.

Stacker Cranes, dynamic loads, dynamic model of the crane column Stacking, dynamic analysis.

Problem. Modern science and technology has led to complex automation warehouse. Application stacker cranes enables more efficient use of warehouse space. Quality control mechanisms of these cranes is measured by indicators such as the number of consumed electricity, positioning accuracy, the size dynamic loads, the number of operations performed per unit time, duration transients. In warehouses stacker crane is the primary means of access to the cargo. When equipment fails to stop service warehouse racks loaded with service that is actually stops working warehouse complex in general. To avoid such situations, the use of a crane stacker in warehouse, you need timely maintenance. Also, when using the crane mechanisms have ensured reliability and durability and minimum values of dynamic loads on the mechanisms of movement and bearing metal structure of the crane. Therefore, to minimize dynamic loads. For this there is a need for dynamic analysis of the crane-stacker.

*** Supervisor - PhD VS Loveykin**

Analysis of recent research. Research to improve dynamic performance stacker cranes involved many researchers [1-5].Their research is mainly based on improving control systems, namely the development of a system of algorithms and software.

Note [2, 4, 5] such as the author of [2] developed a mathematical model of the main elements of a crane Stacking OK-1.0. In models of accountability area that included both motors drives, brakes also imposed simultaneously, the mass of the bridge, trolley, and shows the string attached to the forward movement mechanism for moving mass is concentrated in the mid-span bridge, and the dependence of viscous taken directly proportional to speed.Author of [4] studied the optimization of drying robots explored the dynamics of the crane Stacking PC 1.0, developed his mathematical and dynamical models. The authors of [5] were engaged and dynamic mathematical modeling, design variations columns under inequalities runways, loads acting on the truck stacker at running an obstacle bottom of the column and pressure rollers bridge crane Stacking crane on the way.

The purpose of research is the dynamic analysis of the crane Stacking during acceleration column Stacker crane.

To achieve this goal it is necessary to solve the following problem: to build dynamic and mathematical models describing the movement of the crane Stacking of goods; loose motion equations and construct graphs harakterezuyut transition process start-stacker crane, considering the applied driving force that changes the equation Kloss [6]; analyze the results.

Results. For the study made dvomasovu dynamic [4] model (Fig. 1), which describes the motion of a mechanical system with the following assumptions: reduced weight m_1 includes a lot of columns and equipment assigned to it; reduced mass m_2 includes a lot of cargo; mass movement m_1 and m_2 determined in accordance with the generalized coordinates x_1 and x_2; resilient connection between the masses is characterized by constant bending stiffness c; effort F applied to the drive wheels, changing the equation Kloss; resistance movement W Stacker crane attached to the forward movement. Fig. 1 shows: m_1 - Weight columns and equipment assigned to it; m_2 - Bulk cargo; x_1 and x_2 - Generalized coordinates masses m_1 and m_2; c - Bending stiffness of the column; F - Power drive mechanism reduced to the drive wheels.

For further calculations, use the crane Stacking PC 1.0 [4] engine AYR112MV6 and estimated parameters of the model are shown in Table 1. The dynamic model, shown in Fig. 1, is described by the following system of differential equations [4]:

$$\begin{cases} m_1\ddot{x}_1 + c(x_1 - x_2) = F - W; \\ m_2\ddot{x}_2 + c(x_2 - x_1) = 0. \end{cases} \qquad (1)$$

1. Estimated parameters of the mathematical model.

Parameter	Size
The resistance movement Stacker Crane, W	921.75 N
The diameter of the running wheels	0.2 m
The gear ratio mechanism	6,63
The efficiency of the mechanism	0.91
Cargo weight, m2	9810 N
Weight columns and equipment mounted on it, m1	41398.2 H
The stiffness of the column, with	1,326 · 106 N / m
Maximum torque	92.53 N · m
Critical slip Engine	0.22
The angular velocity perfect idling	104.7 rad / s

The system of equations (1) is nonlinear due not linear drive force, so it is necessary to use numerical integration methods. As a result of numerical integration of mathematical models (1) obtained showing that shown in Fig. 2 and Fig. 3.

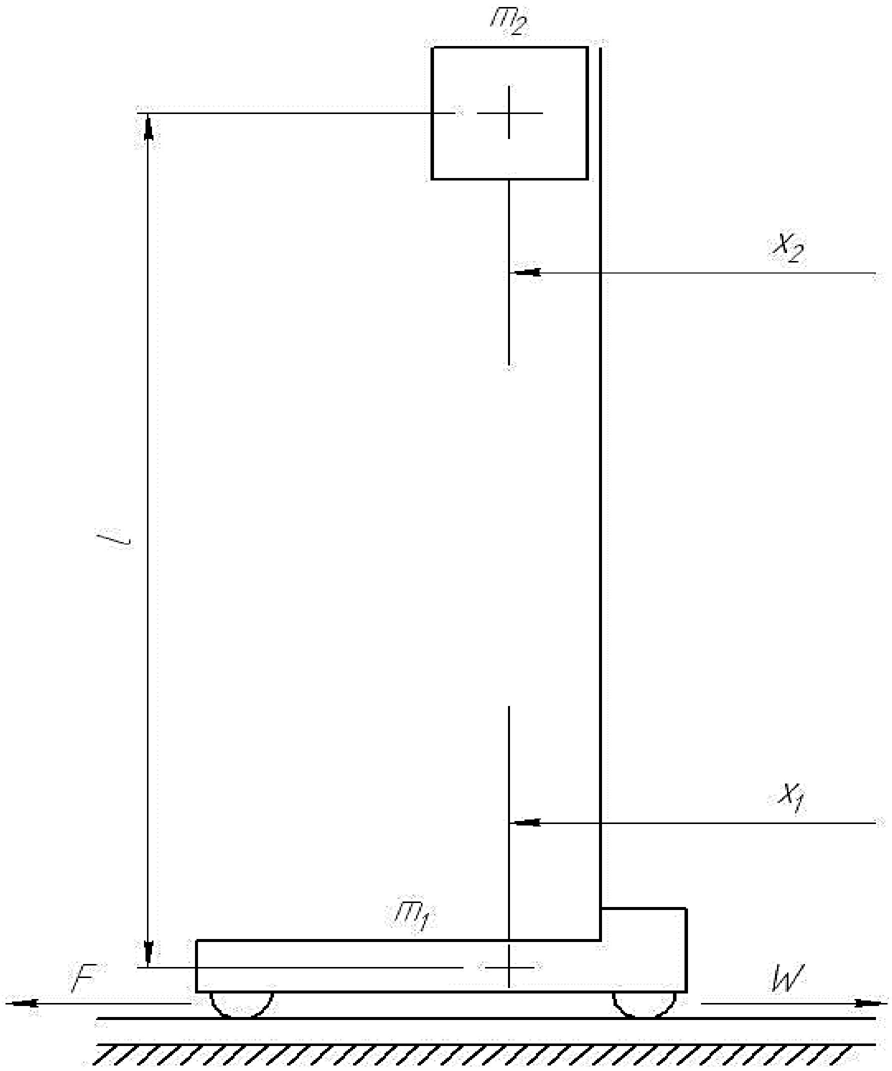
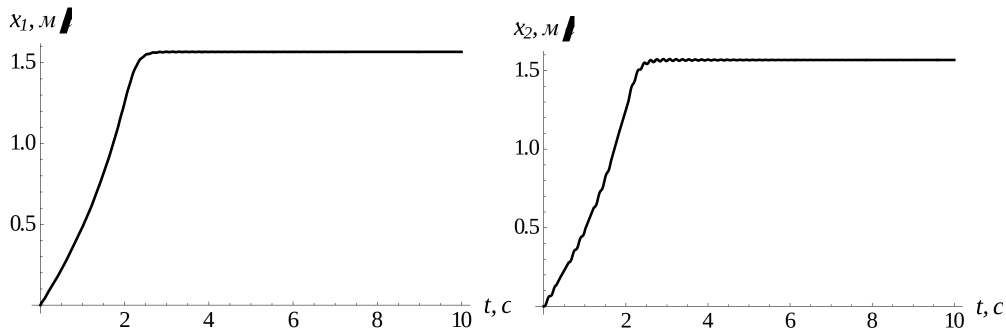
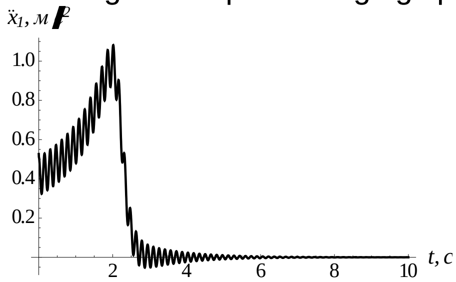


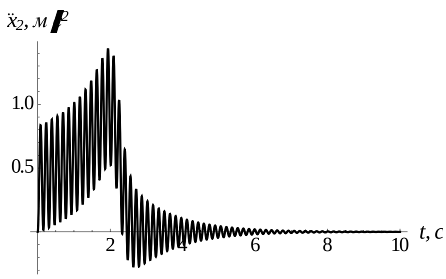
Fig. 1. The dynamic model of the crane Stacking vanatzhem.



a) reduced mass m1 b) reduced mass m2

Fig. 2. Graphs changing speed.





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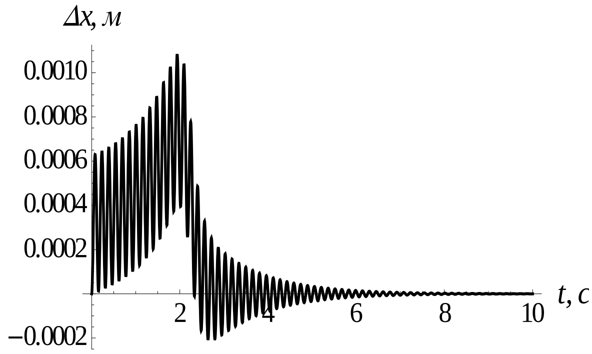
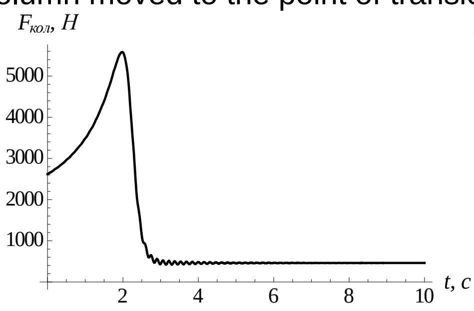
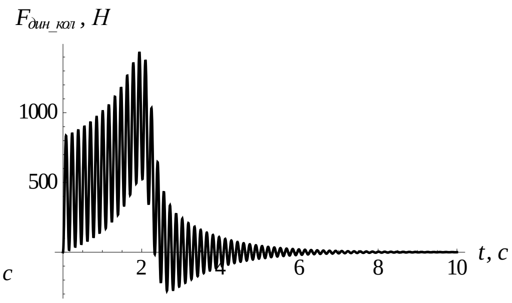


c)

Fig. 3. Schedule changes: a) acceleration reduced mass m1; b) accelerate the reduced mass m2; c) the horizontal deflection of the column moved to the point of transient acceleration.





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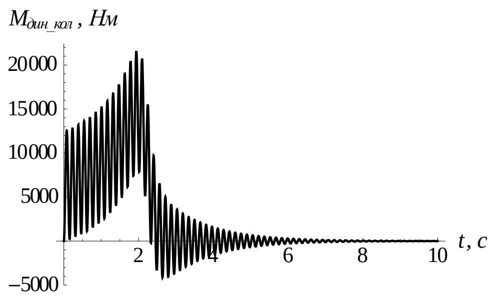

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Fig. 4. Schedule changes: a) force applied to the drive wheels; b) dynamic force applied to the drive wheels; c) columns torque that occurs under dynamic force applied to the running wheels.

Conclusion. Remove string vibrations during early movement possible by optimizing transient acceleration / deceleration. Optimization of the transition process will help reduce the dynamic loads on the metal tap Stacking and improve dynamic performance drilling mechanism.

References

1. Antonets IV Development and Investigation beskontaktnыh detsentralyzovannыh devices adresovanyya management systems avtomatyzyrovannыmy Freight Warehouse complexes: Author. Thesis. on soysk. uch. Class of Dr. those. sciences specials. 05.13.05 "Elements and Devices vy'chislitel`noj Technics and management systems" / IV Antonets. - Ulyanovsk, 2008. - 28 p.

2. SV Polyakov Mathematical Modeling vybroaktyvnoy system overhead crane Stacking with peremennыmy options: Author. Thesis. on soysk. uch. Candidate Class. those. sciences specials. 05.13.18 - "Mathematical Modeling, numerous methods and complexes of programs" and 05.09.03 - "Эlektrotehnycheskye complexes and systems" / SV Polyakov. - Ulyanovsk, 2009. - 19 p.

3. Sedыh MI Increase of the effectiveness avtomatyzyrovannыh mehanoobra-batыvayuschyh plots seryynoho production putem ratsyonalnoho building a standard receiving-sdatochnыh sections:Abstract. Thesis. on soysk. uch. Candidate Class tehnycheskyh sciences specials. 05.13.06 "Automation and Management of technological processes and production (tehnycheskye system)" / MI Sedыh. - M., 2007. - 26 p.

4. Zertsalov AI Gage-shtabelery: Ed. 2nd ext. and pererabot / AI Zertsalov, BI Pevsner. - M., "Mashinostroenie", 1974. - 216s.

5. Klyuchnik AL Analysis of Dynamic behavior and optymyzatsыya stelazhnыh robots: Thesis. candidate. those. Science / Alexander Leonydovych Klyuchnik. - H., 1992. - 180 p.

6. Krytsshteyn AM Elektricheskie mashiny: Methodological specified / AM Krytsshten. - Ulyanovsk: UlHTU, 2003. - 51 p.

In the work conducted by Dynamic analysis of motion-stacker crane. Postavlennaya problem solutions with numerous pomoshchju yntehryrovanyya dyfferentsyalnыh equations of motion Stacker crane.

Results proyllyustryrovanы work schedule, harakteryzuyuschye process razhona kolonnы Stacker crane.

Stacker Cranes, Dynamic load, dynamycheskaya model, column-stacker crane, Dynamic analysis.

The work carried out dynamic analysis of crane Stacker. Of task solved by numerical integration of differential equations of crane Stacker. The results of illustrated graphs that characterize the process of overclocking Stacker crane column.

Truck Stacker, dynamic loading, dynamic model, mathematical model, reduced weight, Stacker crane column, dynamic analysis.