



 Research Article

IMPROVEMENT OF THE COTTON PICKER SUITABLE FOR THE TEXTILE INDUSTRY

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ABSTRACT

In order to improve the equipment of harvesters, we need to have information about modern working bodies for harvesting cotton grown for the textile industry, since new technological equipment is now being imported into our country.

KEYWORDS

Detail, working part, cotton, productivity, plant row.

INTRODUCTION

To date, the design of mass-produced cotton pickers (CP) has several shortcomings that limit the productivity of CP, and reduce their reliability and the quality of the harvested raw cotton. This factor also hinders the increase in HUM exports to countries with similar cotton cultivation practices [1-4].

In particular, the controlled axle of a mass-produced cotton picker has several disadvantages. These are the underload of the controlled axle (wheels), insufficient manoeuvrability, poor manoeuvrability, and inefficient structural location in the structure.



All these factors have a negative impact on the performance of the produced CP. The underload of the steered axle leads to a deterioration in the controllability of the steering wheels. As a result, it is not possible to achieve the minimum turning radius built into the CP design. This disadvantage is also the reason for the low manoeuvrability of the CP. The note leads to an increase in the size of the turning lanes in the fields [6-11].

The discrepancy between the angles of rotation of the inner and outer wheels of the axle causes low controllability and, as a result, the machine cannot confidently overcome bumps and irrigation communications. When the wheels leave ditches and various recesses, the CP rear steered axle is overloaded. This leads to axle failures in the field, which complicates restoration work [12-16].

METHODOLOGY

These problems are completely solvable, for their solution it is necessary to develop mathematical models and make the best technical solution for the development of a controlled CP axis through the use of information technology.

Based on the literature and patent research, several technical solutions have been developed for the design of the controlled axles of the cotton picker. As a result of these studies, a preliminary layout of a 3D model of a steerable bridge based on the previously developed CP MX-1.8 was carried out (Fig. 1).

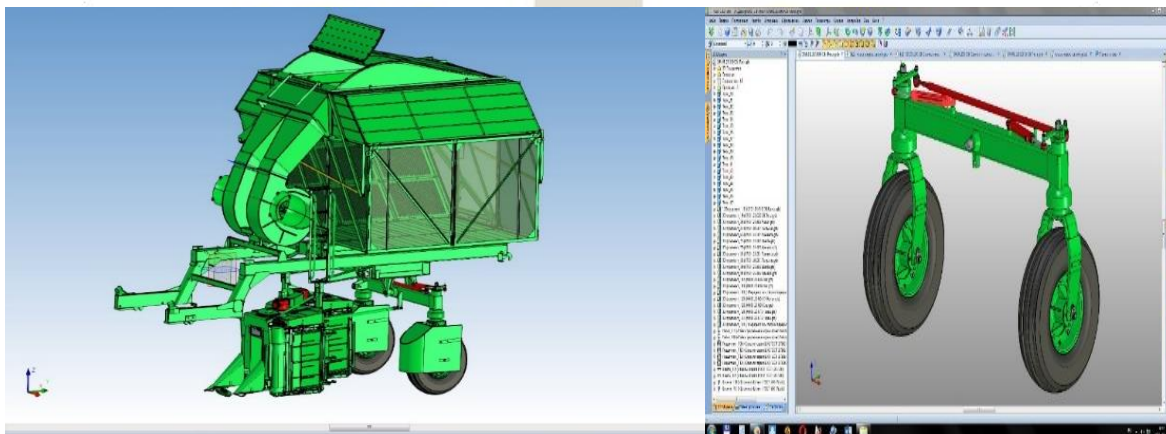


Fig. 1. CP layout without a tractor and steered axle.

In this regard, SKB "Tractor" carries out research and development work on the development and implementation of models, algorithms and software tools for control and decision-making that ensure the optimization of design parameters and the design of the controlled CP axis.

RESULTS AND DISCUSSION

Based on the conducted research, the following conclusions and conclusions were made:

- based on the analysis of existing HUM structures and their comparative assessment, a design for research was selected that most fully meets the requirements of domestic standards and has high agrotechnical and technical and economic indicators;
- the layouts of the mass-produced and modernized CP steerable bridge are considered and kinematic calculations of its main structural components are made;
- developed a mathematical model and algorithm for optimal control of the movement of the guide wheels of the cotton picker MX-1.8;
- A mathematical model of movement was developed and the rolling conditions of the MX-1.8 cotton picker were established;
- A calculation for the static strength of the rear axle beam of the MX-1.8 unit was carried out under extreme types of loading (side sliding, movement over bumps, an insurmountable obstacle) considering two sections, based on which the minimum allowable dimensions for

the design and manufacture of the beam were established;

- the calculation of the static strength of tapered roller bearings was carried out, the results of which showed that the safety factor of their static strength is greater than the permissible value; verification calculation of the total resource of the rear wheel axle bearings showed that the bearings do not have sufficient durability;
- the efficiency of the steering boosters was checked and it was found that when the CP is turned, the movement of the driven wheels in the plane of rotation without slip is ensured, and also two Ts-50 hydraulic cylinders can provide the necessary turning moment;
- an informational description of the characteristics and properties of fasteners, standard normalized parts and assemblies of agricultural machines for the design and execution of the controlled CP axis was produced, the composition of data attributes was identified to support decision-making in the design and manufacturing process;
- An information base of standard normalized parts and assemblies of agricultural machines has been created, a decision support algorithm has been developed for their choice for the design and execution of the controlled CP axis;
- Algorithms for calculating structural and dynamic parameters have been developed to assess the performance of the controlled CP axis under extreme operating conditions.

CONCLUSION

The results of this work are the introduction of a modernized CP into agriculture, which provides stability when driving, a decrease in the turning radius during machine cotton picking, and a simplification of the CP design while increasing its reliability when performing agrotechnical operations.

The technical and economic indicators of the results are expressed in increasing the efficiency and quality of obtaining reliable information in the process of designing the controlled axle of the cotton picker, as well as in the rational use of labour, energy, material and financial resources for research, diagnosis and manufacturing of products.

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