ANNOTATION

For the dissertation of Bekmyrza Zhumash Aitzhanuly on the topic: "Improving the design and operating parameters of a belt conveyor for working with heavily contaminated grain crops" submitted for the degree of Doctor of Philosophy (PhD) in the specialty 8D07102 Technological machines and equipment (mechanical engineering)

Purpose of the study:

Improving the design and operating parameters of a belt conveyor and equipment for working with heavily contaminated grain crops

In accordance with the purpose of the study, the following tasks were set in the work:

- justify the direction of improvement of equipment with heavily contaminated grain crops;
- justify the design and operating parameters of a belt conveyor for working with heavily contaminated grain crops;
- develop experimental setups for studying the parameters of a belt conveyor;
- develop new designs of belt conveyor units and other equipment for working with heavily contaminated grain crops;
- provide an economic assessment of the research conducted.

Object of study:

Technological process of operation of equipment for working with heavily infested crops.

Subject of research:

Patterns of the process of transportation and storage of heavily contaminated crops.

Research methods:

The research methods are based on the fundamental principles of such sciences as lifting and transport machines, grain storage technology and equipment, food production machines and equipment, design of grain storage facilities and processing industries, and the scientific foundations of mechanical engineering technology.

The experimental part of the research was carried out in laboratory conditions at the elevator equipment manufacturing enterprise “Astyk”.

To record electrical parameters, a specialized virtual application developed in the LabVIEW graphical programming environment was used.

To determine the energy intensity of the grain transportation process, the laboratory complex "VP TOE" with the corresponding software was used.

To assess the economic efficiency of the work, a method for determining the economic efficiency of technologies and agricultural machinery was used.

Scientific novelty:

- based on the classification of conveyors, the advantages of belt structures have been established and the direction of their further improvement has been chosen.;

- new original designs of the roller bearing assembly, the silo support frame, the silo roof and the silo fan have been developed to improve their basic technological characteristics of processes with heavily clogged grain;

- a mathematical model has been developed to determine the performance of a belt conveyor for handling heavily clogged crops;

- the dependence of the belt conveyor performance on the angle of inclination of the side rollers has been experimentally determined;

- the design parameters of the roller bearings are justified for optimal operation of the belt conveyor.

Practical value of the work:

- patents for utility models were received:roller support assembly (No. 8458) of the silo support frame (№8464)), silo roofs (№8465) andsilo fan (No. 8670);

- several experimental versions of conveyors for working with heavily contaminated grain crops and a conveyor for production testing were manufactured;

- optimal design and operating parameters of the conveyor when working with heavily contaminated grain crops were proposed to production;

- the research results have been implemented in Temte LLC, Altynsarinsky district, Kostanay region (Appendix O), as well as in the educational process of NAO KRU named after Akhmet Baitursynuly, Kostanay, in the mechanical engineering department (Appendix P).

The main provisions submitted for defense:

- a new design of a roller support for a belt conveyor, consisting of one supporting belt of rollers, which are fixed to the frame and wing, while it is fixed by means of plates to the belt conveyor, characterized in that the frame is made in one piece from a stamped steel profile;

- a new design of a silo support frame made of profiled rolled metal and sheet metal, consisting of sixteen frame posts, a connector, a subframe, two plates, a support rim of sixteen segments, a heel plate, two gaskets, support posts, crescent-shaped ring segments, characterized in that, to strengthen the lower cone, it additionally contains eight vertical subframe supports made of an I-beam, with two diagonal ties on each subframe support;

- new design tosilo roofs made from galvanized elements, consisting of a frame and sectors fastened with stiffening ribs, characterized in that the roof has a conical shape at an angle of 32 degrees at the base;

- results of experiments to determine the performance of a belt conveyor and the established dependence of performance on the design parameters of roller supports.

The economic efficiency of scientific research is assessed based on methods and materials of enterprises that have been tested in practice. The annual economic effect was 3,078,100 tenge per 1 conveyor, the payback period was 0.56 years.

The dissertation of Bekmyrza Zh. A. meets the requirements of the international rubricator 55.57.41 Loading and transport vehicles (mechanical engineering section) used in agriculture UDC 631.37.

The personal contribution of the doctoral student to the preparation of each publication:

All articles by Bekmyrz Zh. A. are based on his personal research, the share of co-authors consisted of design, correction, adaptation to the requirements of the publisher and other secondary works. It is necessaryemphasize the role of the doctoral student in planning the course of research, developing the main stages and activities for completing the doctoral dissertation, substantiating the experimental program, organizing and conducting experiments and analyzing the results obtained, and economic evaluation of research.