

EFFICIENCY OF SEPARATION OF SHELLS FROM GRAIN KERNELS

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The preparation of cereal grains for the production of products ready for consumption is an energy-intensive and most responsible operation aimed at the production of a high-quality final product. The processing of oats, wheat, barley, and other grain crops involves cleaning them from both the impurities present, of secondary origin, and from the integuments of the processed grain. The husking process, which involves the separation of the husks from the kernel of the grain, is very important and is one of the main processes of grain preparation for the production of quality products. The machines used today need not only to carry out such a process, but also to ensure the maximum efficiency of the process and create conditions in the working area of the machine when the action of the working bodies does not cause destruction of the grain structure, ensuring high productivity of the machine during grain processing.

Key words: *husking, grain, shell, efficiency, productivity.*

Problem. For producers whose field of activity is the manufacture of products from materials of plant origin, the problem of separating the shells from the surface of the grain and carrying out the process of peeling (peeling) with ensuring the maximum preservation of the endosperm of the grain from destruction, taking into account the physical and mechanical indicators of the grain and its constituent elements, remains relevant.

Analysis of research and publications. The grain is a capillary and porous structure. Each element has its own characteristics and is characterized by a different structure, as well as having different physical and chemical properties. The main part of the grain is starch, which is a crystalline material similar to cells. The content of protein substances is characterized by an amorphous structure [2]. For grains of cereal crops (which distinguishes grains from a solid body), grains have a spatially anisotropic structure, which leads to changes in mechanical properties. The core of the grain is complex in composition and structure, therefore the existing feature causes the structure of the core to have an effect on the physical and mechanical properties and affects the deformation and peeling [1]. The displacement of the particle from the equilibrium position and the resulting deformation can be reversed if the external force does not exceed certain limits. During elastic deformation, after removal of the external force, the particle returns to its initial state under the action of interatomic interaction forces. Plastic deformation occurs when the load exceeds the elastic limit. Plastic deformation involves "flow" without breaking the integrity of the material. Unlike other deformations, plastic deformation is large-scale and proceeds at a very slow speed [3]. The peeling process is primarily aimed at the mechanical separation of the coated tissue, and data on the changes under the influence of various factors are necessary to verify the parameters of the preparation and the peeling process. In order to objectively assess the strength of the connection between the shell layer and the core, it is desirable to use the peeling strength indicator. The resistance to destruction of the whole grain is higher than that of the endosperm, but lower than that of the shell. Strength limits during grain deformation show that strength depends significantly on the type of active deformation, moisture and structural configuration. It has been established that with an increase in moisture, the tensile strength indicators decrease and, on the contrary, the elastic properties and plasticity increase. The evaluation of the destructive properties for peeling should take into account the change of states during the processing of the surface of the grain [3]. The peeling process is characterized by energy efficiency and high productivity. It is promising to use a combination of

preliminary and final separation. In one machine, a stationary modern separator ensures optimal separation of still unrefined grains

Research results. Methodical bases for the technical calculation of peeling machines have been developed, taking into account the need to ensure the filling factor of the working zone of the peeling machine at the level of 0.7-0.8 in order to minimize the destruction of grains during the peeling process during the production of final products. The necessary intergrain pressure, to ensure maximum external and internal friction in the working zone of the machine with the formation of normal and tangential stress, can be achieved by selecting a rational adjustment between the throughput capacity of the machine rotor and the effective efficiency coefficient for effective separation of the grain husk in the working zone of the rotor-blade peeling machine. The average destructive force for the studied parameters:

- 80 N for wheat;

- 97 N for barley.

After the grains hit the metal parts, the formation of microcracks was observed in 30% of the grains, but no complete deformation was observed, while the speed of the rotating edge of the rotor blade was within 15 M/s, while the number of deformed grains did not exceed 2.0%. For blades with a width of 0.03...0.04 m, the conducted studies proved that the coefficient for the axial movement of grain $K_p = 0.80...0.85$.

Conclusions: The research confirms the geometry and kinematic parameters of the dehulling rotor-blade machine for processing the surface of the grain for the purpose of removing the covering shells.

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ВРАЖАЮЧІ ОСОБЛИВОСТІ КОНСТРУКЦІЇ ТРАКТОРІВ ДЖОН ДІР ТА ЇХ ШИРОКЕ ВИКОРИСТАННЯ

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Американські трактори John Deere стали дуже популярними в Україні. Досягнення компанії John Deere дуже серйозні в нашій галузі: близько 34% сьогоденного імпорту становлять машини цієї марки. Цьому сприяло багато факторів: широкий асортимент тракторів цього виробника, специфічна робота дилерів, продумані програми оренди. Навіть якщо техніка John Deere відіграє свою роль на ринку вживаної техніки, і ця компанія також має високу репутацію (за даними УКАБ, більше 50% ринку вживаних тракторів припадає на Deere) [1].

Серії створені для титанів із широким діапазоном сил, але для різних цілей. Джон Дір виробляє трактори, спеціально призначені для полів, садів, баштанних культур і