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CONDITIONS FOR MODELING OF CUTTING UNLOADING FROM THE HOPPER

Many machines that are used in production lines, deal with such workflows, as loading, unloading, handling, selection, transportation and etc. of different bulk materials. Efficiency and high-quality operation of such machines depends, primarily, on the speed of the unloading, the parameters and operation modes of handling devices [1-2]. The issue is complicated by the need to ensure a uniform and continuous unloading of material one size (length) of which is significantly higher than the other two sizes.

An example of such a material is cutting. This issue is an up-to-date one due to increased popularity of fuel on the basis of bioenergy crops and, consequently, the need in fast and efficient machines to create so called energy plantations. One of the most common crops is energy osier. The osier is planted by vegetative way with the help of cutting 20-25 cm long and 8-20 mm in diameter (graph 1).



Graph1: Energy willow planting material

Planting is carried out by machines in which the planting material is fed manually (graph 2). This significantly limits the possibility of improving the efficiency of the units.



Graph 2: Traditional energy willow planting with manual feed cuttings.

To create a machine for planting such material the cutting should be transported fast and accurate. The study is an attempt to find strategies for justifying the cutting movement during their unloading from the accumulative capacity [3-6].

In general, the tasks associated with the loading and unloading of bulk and lump material operations, that are aimed at reduction of manual labor, at increase of performance and transport load factor, are of great importance. A lot of scientists and researchers focused on the issue of process stability in unloading material from the storage hopper [7-9]. To achieving positive results of their scientific research would not have been possible without the in-depth study on the patterns of granular material characteristics. The phenomenon of bridging takes place in the technological process of hoppers and vehicles with bodies of hopper construction. As a result, the time of complete cleaning of storage hopper and bulk cargo transportation is increased. This leads to violations of safety requirements in carrying out the activities and sufficiently large financial losses.

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