5th Polish Congress of Mechanics
25th International Conference on Computer Methods in Mechanics
4-7.09.2023
www.pcm-cmm.com
contact@pcm-cmm.com
GLIWICE

Operation of a new type vibratory conveyor on a descending slope of the second resonance

W. Żmuda[1], P. Czubak[1]

[1] AGH University of Krakow, Mickiewicza Av. 30, 30-059 Krakow, Poland
Corresponding author e-mail: wezmuda@agh.edu.pl

ABSTRACT

In the hereby study, the possibility of using a new vibrating conveyor with a single-vibrator drive, equipped with an additional anti-resonance eliminator mass, which was submitted by the authors for patenting, was analyzed. The work of the conveyor operating on the descending slope of the resonance zone was investigated. Such a way of device operation is atypical for vibrating machines and entails the risk of spontaneous resonance as well as the problem with obtaining the appropriate angular velocity of the inertial drive. It should also be noted that working in this frequency range entails risks such as difficulties in maintaining a constant rotational speed of the electric vibrator. The advantage of working in this zone is the reduction of the amplitude of the additional mass (the eliminator) while maintaining the amplitude of the trough. This is beneficial considering the high stiffness of the eliminator's suspension, which when subjected to significant deflections, will be at risk of material fatigue. A further advantage of this control strategy is the reduction of energy losses associated with dissipation in the eliminator's suspension. In the work, analytical tests were carried out using a simplified model of the device. Subsequently, numerical simulations were performed on a complete, accounting for the bulk material. The results of the analyses were confirmed through laboratory tests conducted on conveyor built according to the invention with industrial parameters.

Keywords: vibrations, vibratory conveyor, dynamic eliminator, transport stop, feeder, material dosing.