RESEARCH ON VARIATION OF DISPLACEMENTS, VELOCITIES AND ACCELERATIONS AT A SITE SELECTOR BLOCKS (FANNER) GRAIN

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Abstract: *The researches aimed to study and establish technologies vibratory phenomena involves the tools and machines for processing agricultural products type wheat. The data recorded in the experiments were statistically designed a series of graphs showing the correlation between the outcome and the functional characteristics accompanied by reports of correlation. Functions developed have allowed us to draw a number of conclusions nature of generalization.*
Keywords*: displacement, velocity, acceleration, selection, seed.*

1. Introduction

The material obtained after harvesting with combine in the form of a mixture of primary culture seeds, grains of other crops, seeds of weeds, and various impurities (scrap straw, chaff, dust, sand, etc.), and the seed culture besides the main cover normally developed seeds, seeds dry, shriveled or broken, and others. [1].

After the harvest, agricultural products (grains, fruits and vegetables) can not be directly used for various purposes such as: storage, consumption, industrialization, commercialization, seed material, since contain impurities (plant debris and other objects) and products injured. Products harvested before receiving a particular destination is necessary and required to undergo cleaning and sorting operations.

Through these operations [2], aims to increase the purity of the product, whilst achieving best storage conditions, and a reduction in the transport and storage.

For operations of cleaning and sorting of seeds obtained after harvest, usually with combinations, using special complex equipment specific to this domain [1,2,3].

In these machines, an important place flat site blocks whose operation is based on the vibratory movement of the working surfaces. These are used to perform the separation of mixtures of grains which differs by one of the two geometrical dimensions of their thickness or width.

Other authors in various works conducted various statistical analyzes, [5].

There are other methods and principles of separation of impurities in seed mass, which may be based on other operating principles, such as using air currents, tables densimeters separation after elastic properties, etc..[4].

Studies on the angle of the dials was conducted by the authors of paper [6].

2. Material and methods

In order to conduct experimental research needed for the thesis using winter wheat (variety Flamura 85).

Experiments were performed in laboratory experimental bench, resulting in adaptation Mechanical Vânturătorii VM - 4 existing laboratory of Agricultural Machinery Agricultural Mechanization team of University of Agricultural Sciences and Veterinary Medicine Bucharest.

The experimental stand (Figure 1) is designed for cleaning and sorting by size and by the aerodynamic properties of seeds of cereals, pulses, industrial crops, grasses obtained from or combine threshers.

It is used for cleaning and grading seed crop following wheat, rye, barley, oats, rice, peas, beans, lentils, flax, mustard, hemp, sunflower, millet, rape.

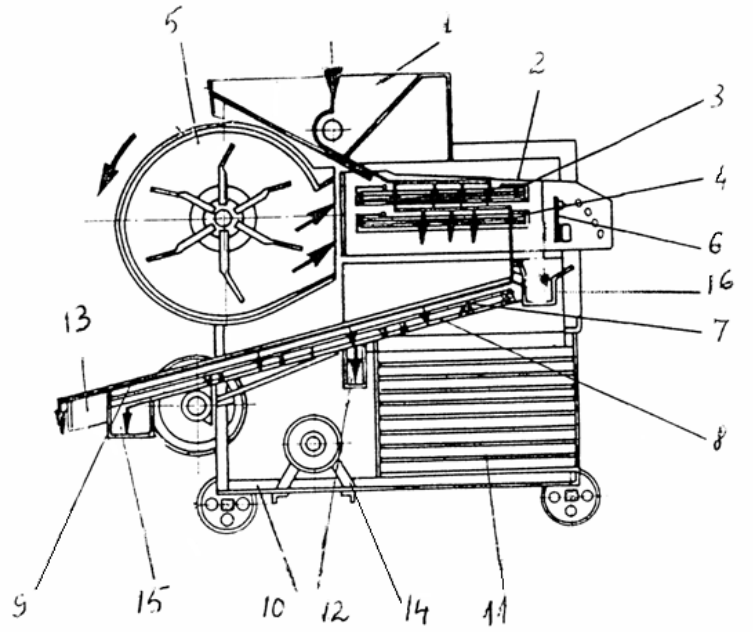


Figure 1. Stade experimental

Part of the stand experimentall: 1 – food cart; 2 – Superior support frame site; 3 – First sieve the upper bearing pedestal; 4 – Second Screening upper bearing pedestal; 5 – fan; 6 – shutter to evacuate chaff; 7 – shutter to evacuate chaff; 8 – first sieve the lower bearing pedestal; 9 – the second screen of the lower bearing pedestal; 10 – framework; 11 – site backup box; 12 - small impurities trough drain and leaks; 13 – a seed discharge chute topping; 14 – Electric motor drive; 15 - Seed discharge chute second rate; 16 – chute to evacuate large impurities.

For experimental determinations was used as a chain composed of the following devices:

1) - like National Instruments data acquisition with the following features: 24-bit resolution, sampling rate of 50 kS / s analog input 4 channel simultaneous, dynamic range 102 dB input range + / - 5 V, USB 2.0 interface for PC connectivity
2) - four accelerometers Brüel & Kjær 4508B with magnetic fastening and metal clip, each connecting cable with the following characteristics: - Description: top connector TEDS, sensitivity 100 mV / g, frequency range limits 10% (± 1dB): 0.3 to 8000 Hz resonance frequency: 25 kHz, the residual noise level: 0.35 mg operating temperature range: -54 100 deg C measuring range: 70 g; maximum level of shock: 5000 g weight: 4.8 grams connector: 10-32 UNF, mounting: magnetic and metal clip, connection cable length acquisition board: 5 m interface cable connection to acquisition board: BNC.
3) - computer software Labview data acquisition and processing;

In order to achieve the four measurements used accelerometers were located in pairs diametrically opposite the center of the grid being able to determine vibrations both in the tangential direction and the radial direction.

Two accelerometers are able to determine the parameters of the vibrations in the radial direction, while the other two accelerometers are methods of determining the vibration parameters for the tangential direction.

Measurements were made both idle and for driving the load in two directions, both in the radial direction and the tangential direction as.

The four accelerometers were connected to the data acquisition board via a computer with printer for plotting the acquired signals.

Before each sample were adjusted accordingly cinematic parameters namely oscillating sieve oscillation frequency or amplitude of oscillation. For driving the load and oilseed rape have been used, measurements are made at about the same flow conditions. It was tried to be kept constant in all experimental measurements, that is around 0.01 kg / s.

Acquisition time was several seconds (8-12 seconds), the signals are acquired by taking on only those corresponding to a relatively uniform movements work site.

Signal acquisition was made through LabVIEW, data acquisition was performed before program structure by which the purchase was made and signal processing.

For plotting the acquired signals can also use a printer that can be connected to laptop computer.

Variation of displacement, velocity and acceleration of the upper block of the site in relation to time under load and at idle is achieved in the graphs in Figures 2 ... 13.

Changes in driving higher building site in relation to the time course load for the angle of the upper sieve higher block site ($\alpha = 3^\circ, \alpha = 6^\circ, \alpha = 9^\circ$), and the angle of the lower grid block below the site $\beta = 5^\circ$ is shown in figures 2-5.

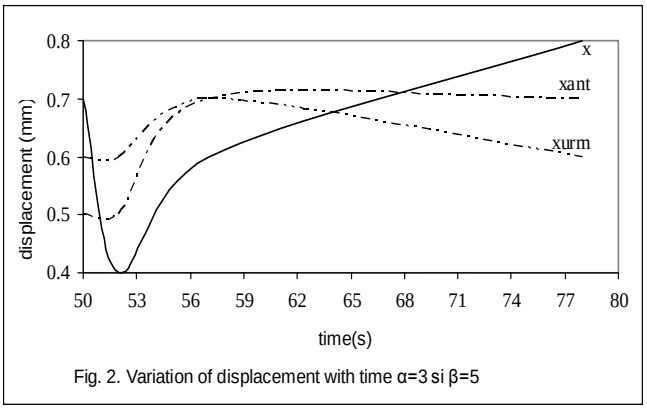


Fig. 2. Variation of displacement with time α=3 si β=5

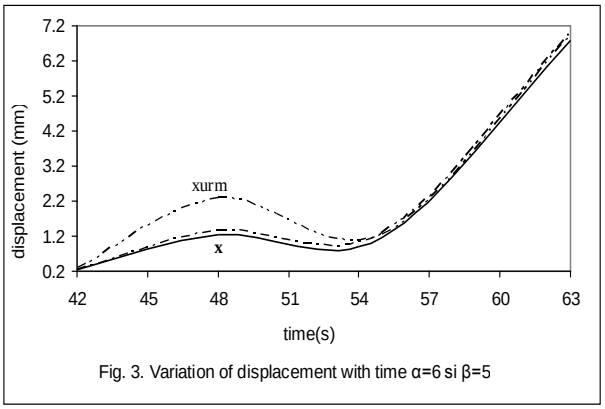


Fig. 3. Variation of displacement with time α=6 si β=5

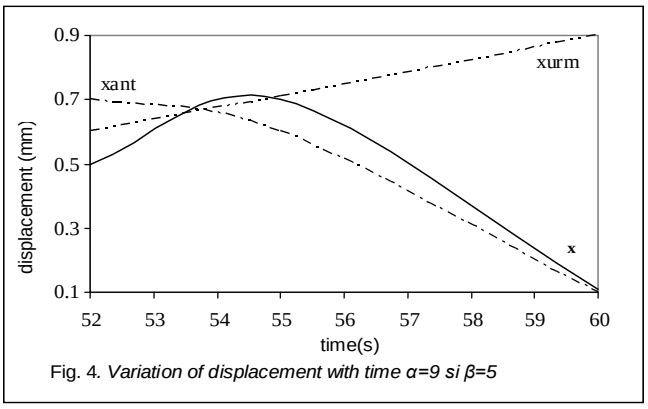


Fig. 4. *Variation of displacement with time α=9 si β=5*

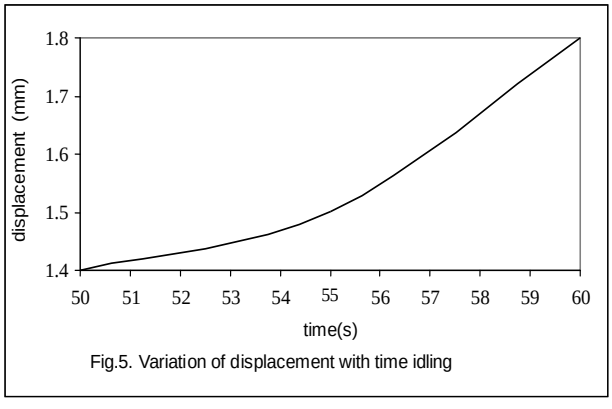
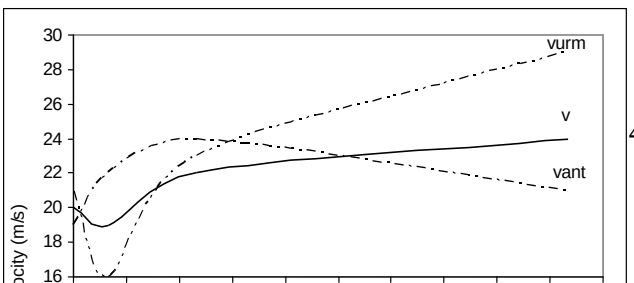
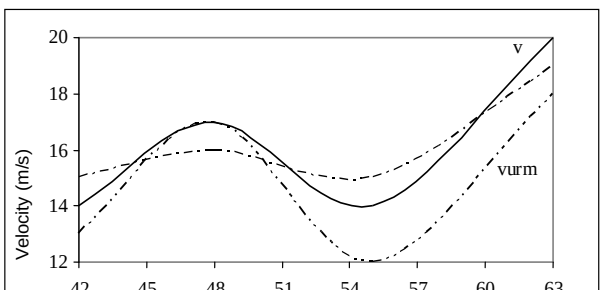


Fig.5. Variation of displacement with time idling

Superior building site speed variation against time to walk to load the hopper angle higher upper block site ($\alpha = 3^\circ, \alpha = 6^\circ, \alpha = 9^\circ$)and the angle of the lower grid block below the site $\beta = 5^\circ$ is shown in Figures 6-8 and in Figure 9 is shown the upper block with site speed range at idle.





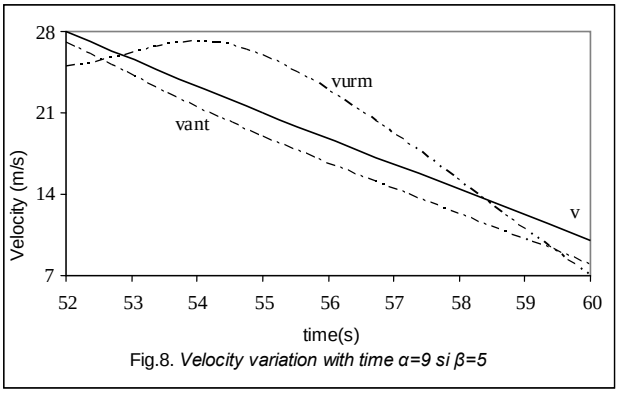


Fig.8. *Velocity variation with time α=9 si β=5*

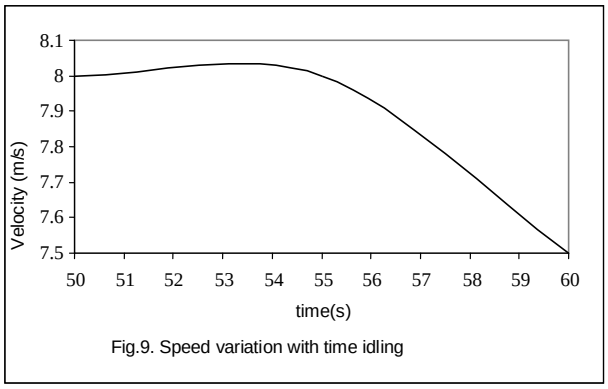


Fig.9. Speed variation with time idling

Superior building site acceleration variation with respect to time in the course load for the angle of the upper sieve higher building site ($\alpha = 3^\circ, \alpha = 6^\circ, \alpha = 9^\circ$) and the angle of the lower grid block below the site $\beta = 5^\circ$ is shown in Figures 10-12 and Figure 13 presents the variation in acceleration higher block site at idle.

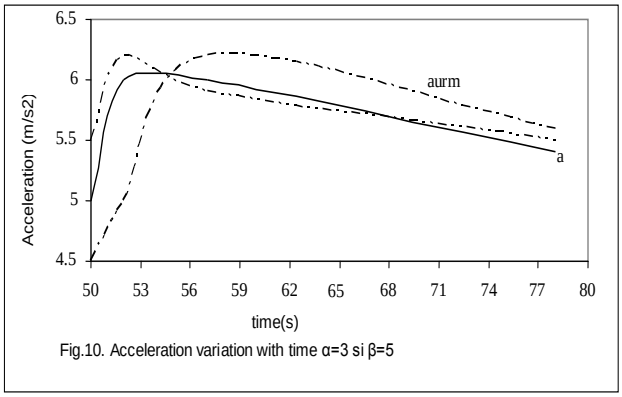


Fig.10. Acceleration variation with time α=3 si β=5

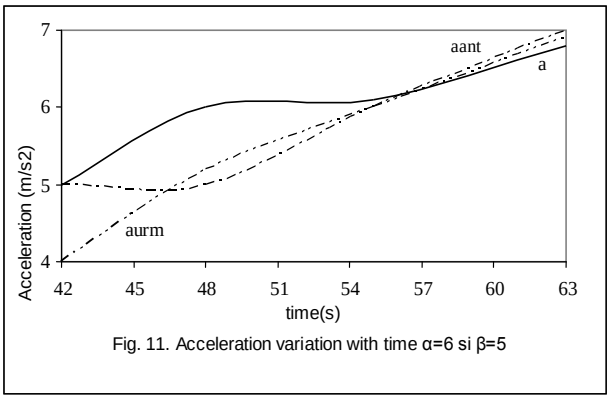


Fig. 11. Acceleration variation with time α=6 si β=5

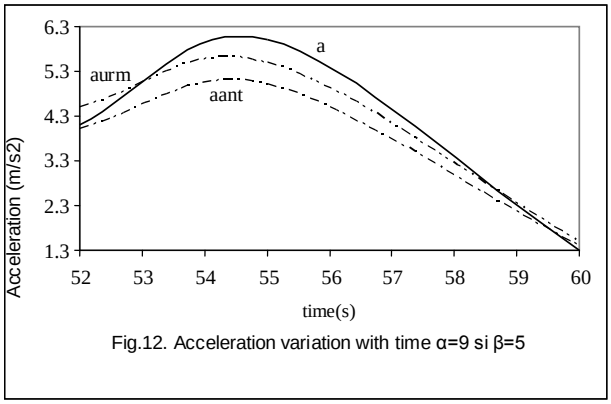


Fig.12. Acceleration variation with time α=9 si β=5

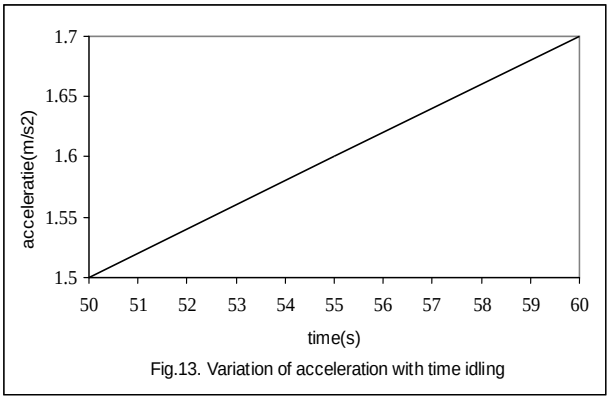


Fig.13. Variation of acceleration with time idling

Conclusions

The process of separating the holes of the seed hopper is achieved by providing a relative movement of the seed from the hopper. This relative movement to provide, by printing a grid linear oscillatory motion of a drive mechanism (connecting rod - crank, eccentric).
Vibratory movement is applied in practice in various fields including agriculture And food industry, both for the transport of granular and powder products, or even in the form of pieces, as well as processes to achieve the separation, or to remove impurities from the mixture seed or plant products sort by size. Separators is done in the form of block printing mechanisms driven oscillating movement screening material found on the surface of separation. The mechanisms that generate oscillations can be: crank, with backdrop oscillating vibrating devices unbalanced unbalanced rotating or vibrating devices electromagnets etc..
From the dynamic point of view, the separator is a vibrator vibrating with one or more oscillating masses linked to the support and to each other by elastic elements (made of metal or rubber) and a drive system (drive) to ensure the generation of disruptive forces necessary for a stable oscillating.
Working body vibration machine (the block making) has a generally translational movement, linear or circular, depending on the type of vibration generator.
The vibration generators used to operate the oscillating blocks are present as well, the rotating unbalanced mass, which results in a force directed interference (one-way).

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