

AMPLITUDES INFLUENCE ON THE PROCESS OF SEPARATION A GRAIN SELECTOR

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Abstract: The researches aimed to determine the influence of structural and functional parameters of the experimental stand bodies active work on quality indicators and operating. 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: oscillation frequency, amplitude, velocity, acceleration, site blocks

1. Introduction

Mechanical vibrations are the alternative movements of a point, people or systems of bodies around a reference position considered, [1].

The technique as such is in a range of vibration of the simple harmonic vibration, to the more complex, non-stationary random vibration, [2].

In measuring vibration can use three basic parameters: displacement, velocity and acceleration, [3].

The shape and spectral content of the vibration signal is the same regardless of whether it has one or the other of the parameters, but shows, however, a phase difference between them.

Concludes that there is no preferential parameter measurements of vibration.

The most common vibration transducers are those which record the vibration acceleration as a parameter, called accelerometers.

However in practice it is recommended displacement measuring vibration when they contain low frequency acceleration measurement is recommended for high-frequency vibration, [3].

Recording speed vibration frequencies used in the middle of the vibration velocity as a parameter providing the flattest frequency spectrum.

Other authors in various works conducted various statistical analyzes, [5, 6, 7].

Speed can also be a criterion for assessing the destructive effect that can cause vibration when the speed is directly related to the energy of vibration.

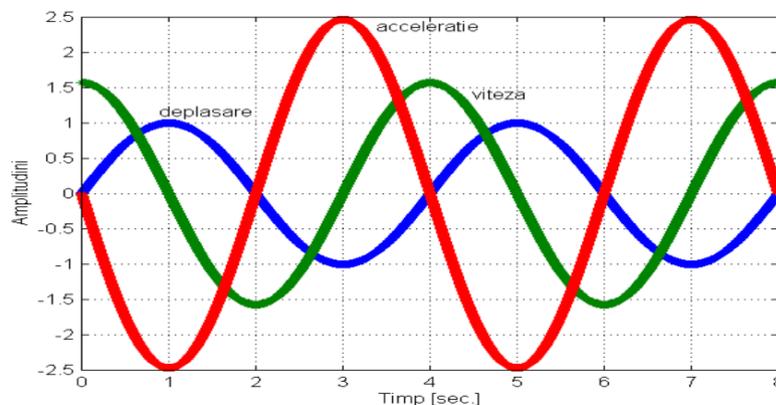


Fig.1. Vibrație armonică reprezentată prin parametri săi: deplasare, viteză, accelerație [3]

Practice daily, as is the case of agricultural products processing machinery using vibration in their working process shows that the movement of bodies can be considered as a result of a number of overlapping harmonic vibration.

Thus the harmonic vibration analysis can be considered as a material point elongation of the body of work represents the distance from a point to its reference position, the amplitude of vibration is maximum elongation in meters.

Vibration period is determined by the time in which the complete oscillation (in seconds) the frequency of oscillation representing the number of complete oscillations per unit time (measured in $\text{Hz} \equiv \text{s}^{-1}$).

Other parameters can be considered vibration pulsation, ω (rad / s) and the initial phase φ in rad. Speed and acceleration point harmonic vibratory motion of the point are given by rel (1) and (2), [4,8].

$$v = -A\omega \sin(\omega t + \varphi) = A\omega \cos(\omega t + \varphi + \frac{\pi}{2}) = v_{\max} \cos(\omega t + \varphi + \frac{\pi}{2}) \quad (1)$$

$$a = -A\omega^2 \cos(\omega t + \varphi) = a_{\max} \cos(\omega t + \varphi + \pi) \quad (2)$$

where:

- A - amplitude vibration (maximum elongation) (m);
- ω - Pulsation (rad / s);
- φ - initial phase (rad).

For a harmonic vibration vibration shape and angular velocity remain the same regardless of the parameters considered only between travel speed and introduce a lag of $\pi / 2$ as can be seen in Figure 1.

The vibrations to which the time-varying amplitude of vibration are called amplitude-modulation, while the vibration frequency and / or time-varying angular frequency is called vibration frequency modulated.

Vibration measurement using analog electronics that operate with electrical signals obtained from converting vibrations into electrical current or voltage variations using specialized transducers.

2. Material and methods

During an experiment, the parameters of the practice of experimental plants adjust to the desired values (frequency and amplitude of oscillation) drive motor on and data acquisition system running on the computer monitor appear simultaneously two different graphic sets, showing purchase through the program Labview.

On the left side of the screen displays the time variation of accelerations recorded for the four accelerometers placed on the surface of the separation cone graphics signals representing vibrations, while on the right side of the screen are displayed one below the other four graphs that represents the change in oscillation frequency acceleration, motion graphics that are spectrograms of oscillation (vibration spectrums).

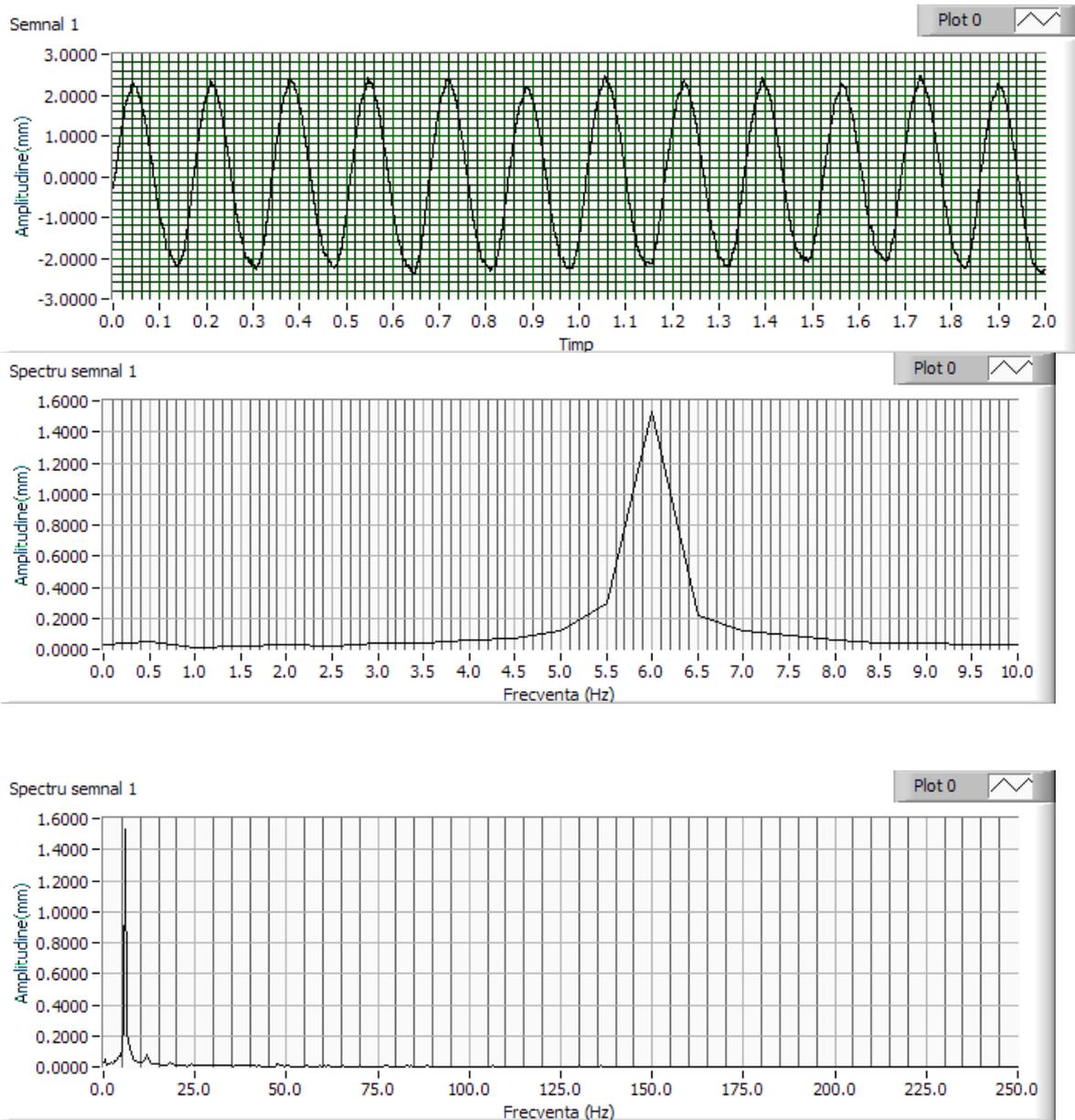
In order to determine the influence of vibration amplitude oscillations on the grid tapered experimental determinations were performed for both the experimental stand idle and when driving in pregnancy.

With the help of the purchase made and the program developed in LabVIEW were purchased vibration signals to the four accelerometers placed on the surface of the separating grid. Two accelerometers acquires the signal in the direction of the arm, and the other two in a direction perpendicular to the arm about the drive shaft.

Oscillation frequency of the grid values were taken, recorded and then used in the analysis of experimental research results related to the analysis of the separation of the analysis of vibration spectra acquired from experimental research on vibratory movement of the grid, depending on the speed control knob position the drive motor.

In Figures 2, 3 and 4 are variations amplitude, velocity and acceleration higher building site load frequency $f = 4.6 \text{ Hz}$.

Figure 2. Amplitude variations over using accelerometers mounted on the upper block site



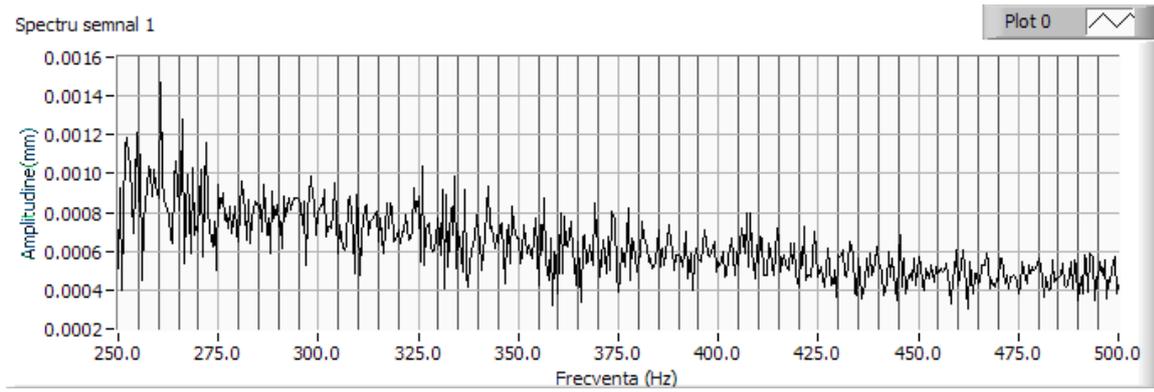
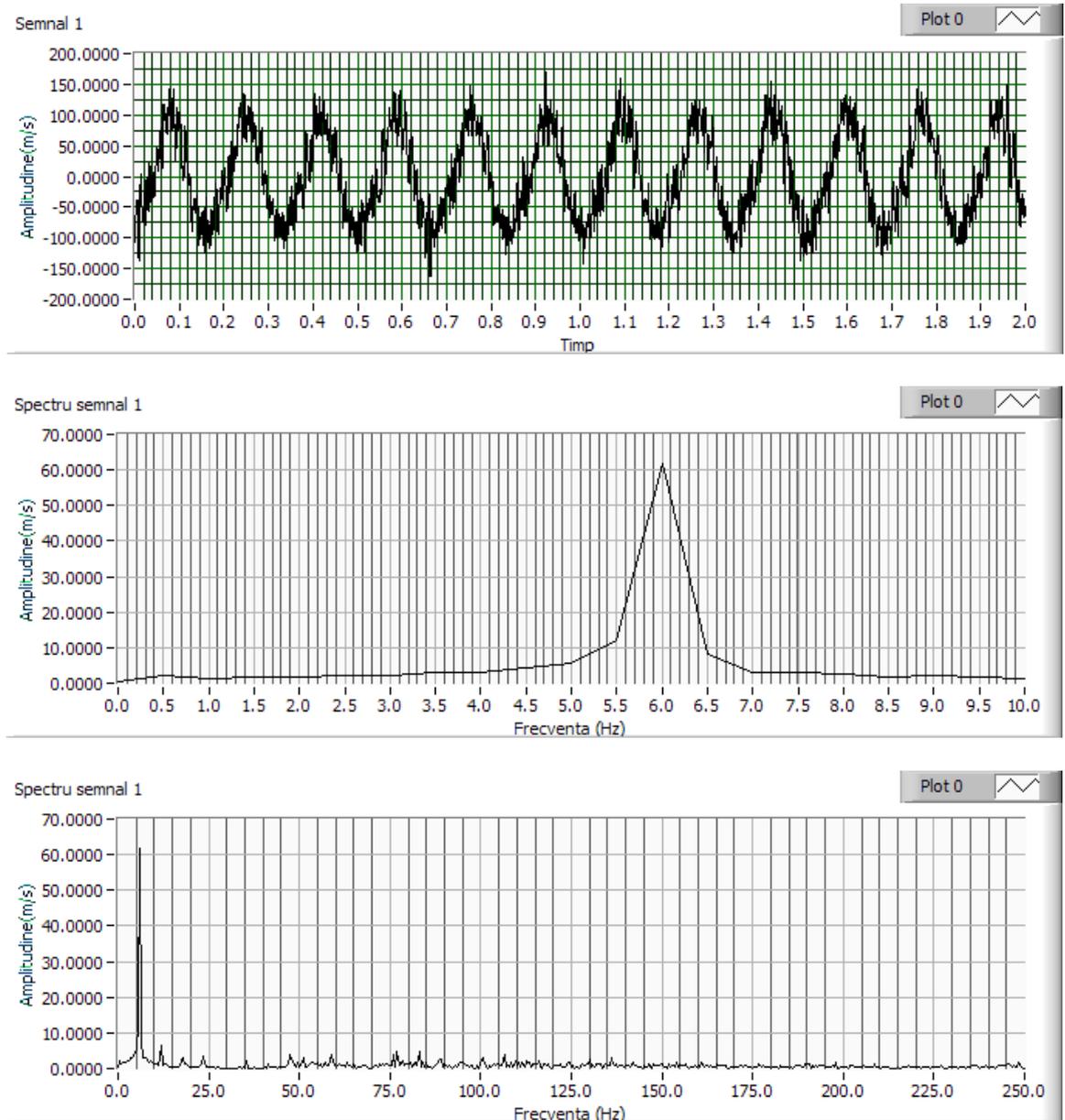


Figure 3. Speed signal variations over using accelerometers mounted on the upper block site



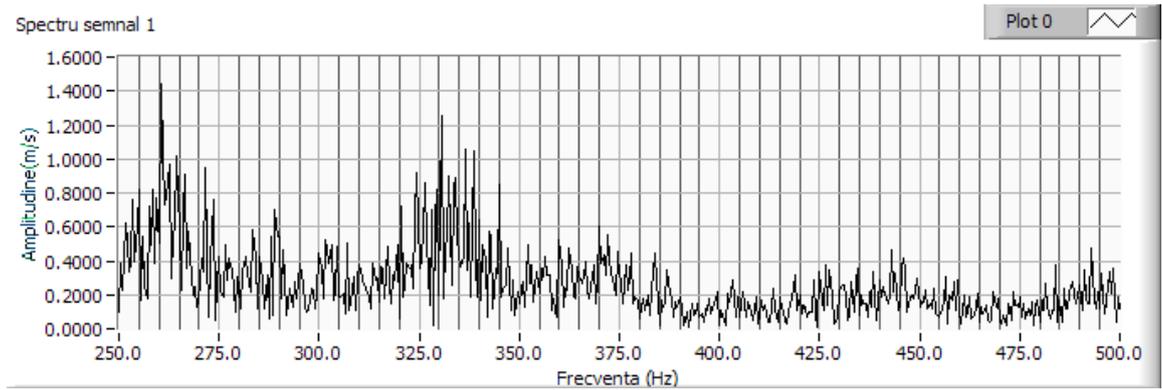
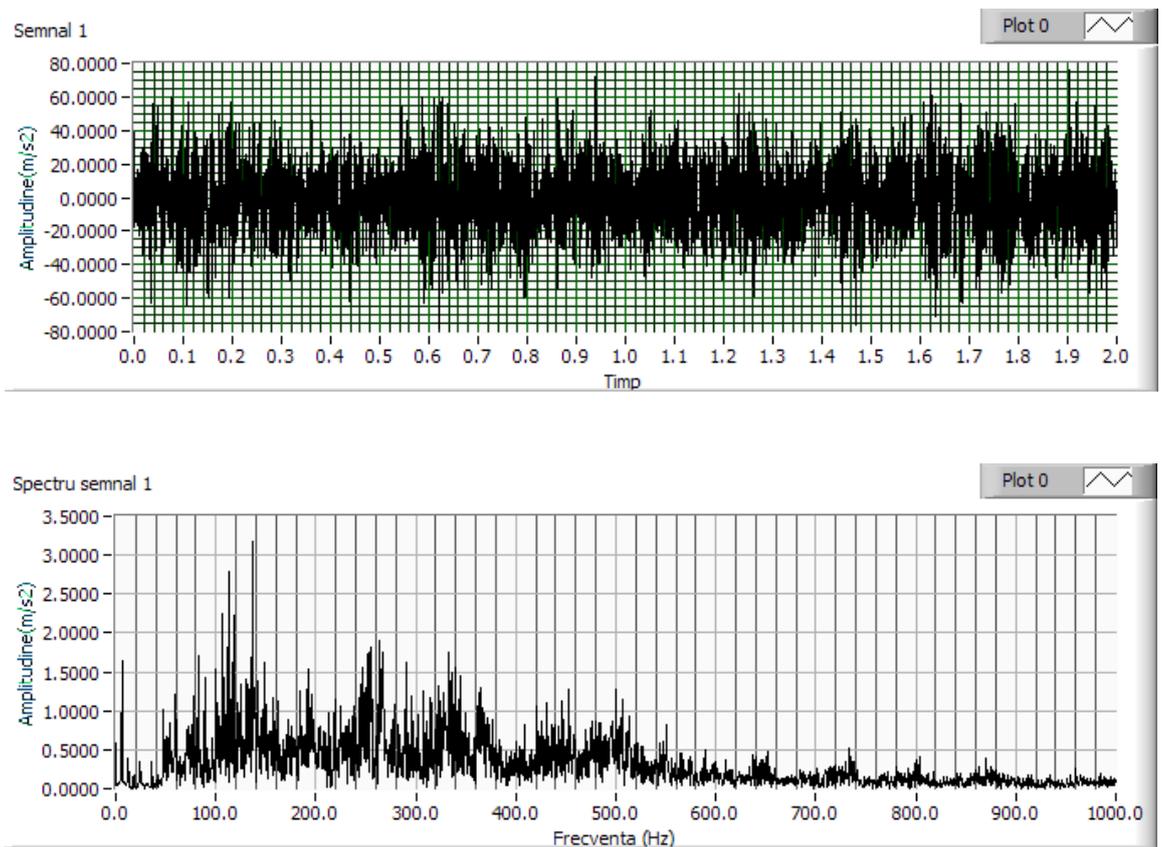
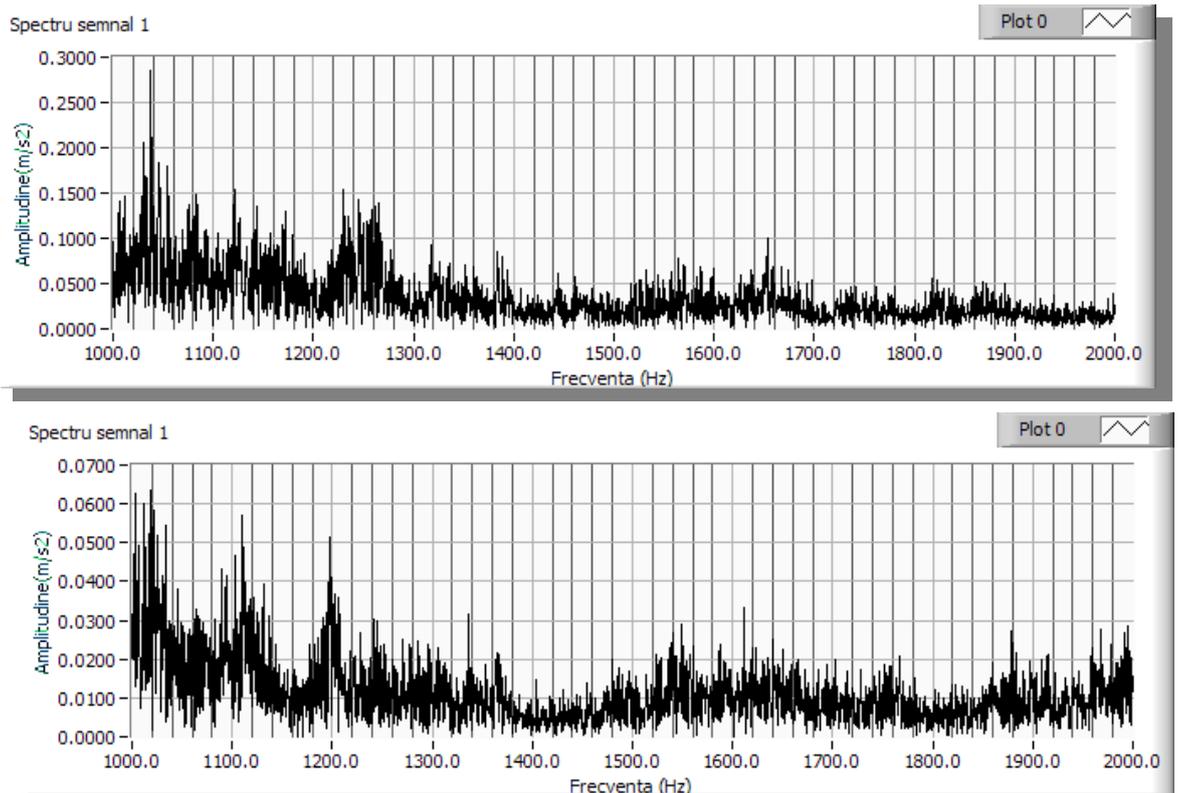


Fig.4. Acceleration signal variations over using accelerometers mounted on the upper block site





Conclusions

1. The variation in time of the forces and moments developed by the vibration generators used in the machines for processing of agricultural products depend on the movement of the body to be driven, and the characteristics of the engine to give rise to unbalanced masses (speed, power).
2. Kinematic study of surface separation (body work) is required to estimate the interaction with the workpiece and its movement on the work surface, coupled with the proper conduct of the process of separation or transport.
3. Differential equations resulting from the theoretical study of vibrational phenomena of oscillating blocks are usually quite difficult to solve, requiring the use of numerical methods and several iterations (maybe hundreds), and graphical plotting vibration parameters (acceleration, speed, travel) may not correspond to the actual spectra determined experimentally.

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