Contributions Regarding the Static and Dynamic Behavior of the Vibrating Table named "VISO"

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Abstract: - The paper aims to start from the cracks that appear on the actual vibrating table"VISO" thru load the table statically and dynamically and then studying its behavior during loading. It is mentioned that the table sorts vegetables and fruits and works based on the displacements produced by two eccentric engines that transmit vibrations through the carbon lamellas attached to the frame and the sieve.

Key-Words: - Theoretical analyses, vibrating table, simulated model, solutions regarding static and dynamic behavior, frame and sieve.

Received: March 27, 2023. Revised: October 4, 2023. Accepted: November 15, 2023. Published: December 14, 2023.

1 Introduction

The principle of operation and design of vibrating tables are well known according to specialized literature, [1], [2], [3], [4], [5], [6], [7], [8]. There is the role of sorting the fruits and vegetables by size as required by the manufacturer by moving the sieve to the excitation given by the vibrations. It takes into consideration a vibrating table named "VISO". It will analyze the static and dynamic behavior of the vibrating table from the perspective of two new materials chosen by the paper's authors. All these are in contrast to the material chosen by the table manufacturer, which proved not to withstand the demands of the table and began to crack in the engine area under the frame area notated with 4 (Figure 1).

2 Describing of Elements of the Vibrating Table

This paper aims to highlight the risk areas appearing in the table structure, especially at the frame during its static and dynamic operation. All of these are carried out under the action of vibrations produced by eccentric engines mounted at an angle of 25 degrees from the vertical axis and located under the frame. The force transmitted by them is perpendicular to the carbon lamellae that connect the sieve to the frame on one side and the other. Figure 1 shows the basic elements of the vibrating table "VISO", [1], [2], [8].

The components of the vibrating table that compose the table are the carbon lamellae (2) that connect the sieve (1) to the frame (3) and are arranged symmetrically on one side and the other of the sieve, under a well-defined angle (25^0).

The transmission of vibrations from the eccentric engines (4) under the frame (two pieces) will made at an angle of 90° on these lamellas. The engines are located under the frame in the area shown in Figure 1, and they are fixed on auxiliary plates of the frame and attached to its inside. Two T-shaped legs (6) on four supports with standardized cylindrical rubber elements (5) connect the frame. These have the role of reducing vibrations transmitted to the legs and the floor.

These studies were necessary because of the existing frame crack in a hall, and the suspected reason was the excessive vibrations transmitted from the engines to the frame.

However, when the vibrating table is manufactured at the large size required by the manufacturer, namely, the design of the table with larger dimensions (in the present case approximately 10m length), by an adaptation of the location where its presence was necessary, appears an interesting a phenomenon (these cracking). These cracks appear because a large proportion of the vibrations will be transmitted to the sieve, and the difference is sufficient to produce cracks in the frame. The overlapping of vibration at frequencies generates the phenomenon of resonance and frame cracks.

In the following, the paper will address these aspects and try to provide technical solutions of design to the problems that have arisen.

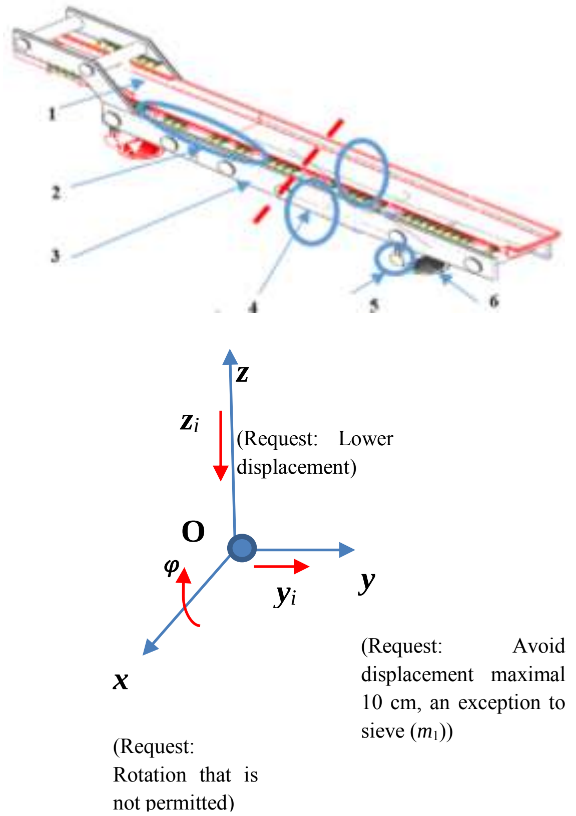


Fig. 1: Main elements of vibrating table and engine area, [1], [2].

3 Vibrating Analyses

3.1 Owner Pulsation of the Vibrating Table

Regarding the analysis of the natural frequencies of the vibrating table in Figure 1, the following approach presents the unknowns of the system (1) that will replaced with those from Table 1.

Table 1. Unknown of System, [2]

Variable input in a system		
$y_1 = a_1 \cos\omega t$	$\dot{y}_1 = -a_1\omega \sin\omega t$	$\ddot{y}_1 = -a_1\omega^2 \cos\omega t$
$y_2 = a_2 \cos\omega t$	$\dot{y}_2 = -a_2\omega \sin\omega t$	$\ddot{y}_2 = -a_2\omega^2 \cos\omega t$
$z_1 = a_3 \cos\omega t$	$\dot{z}_1 = -a_3\omega \sin\omega t$	$\ddot{z}_1 = -a_3\omega^2 \cos\omega t$
$z_2 = a_4 \cos\omega t$	$\dot{z}_2 = -a_4\omega \sin\omega t$	$\ddot{z}_2 = -a_4\omega^2 \cos\omega t$
$x_2 = a_5 \cos\omega t$	$\dot{x}_2 = -a_5\omega \sin\omega t$	$\ddot{x}_2 = -a_5\omega^2 \cos\omega t$
$\alpha = a_6 \cos\omega t$	$\dot{\alpha} = -a_6\omega \sin\omega t$	$\ddot{\alpha} = -a_6\omega^2 \cos\omega t$

Frame:

$$\begin{aligned} & m_2 \cdot \ddot{y}_2 + k\cdot(y_1 - y_2) + k^*\cdot(y_1 - y_2) + c\cdot(\dot{y}_2 - \dot{y}_1) = 0 \\ & m_2 \cdot \ddot{z}_2 + k\cdot(z_2 - z_1) + k^*\cdot(z_2 - z_1) - c\cdot(\dot{z}_2 + \dot{z}_1) = 0 \\ & m_2 \cdot \ddot{x}_2 + (k + k^*)\cdot x_2 + (k^*\cdot l_2 + k\cdot l_1)\cdot\alpha + c\cdot\dot{x}_2 + c\cdot l_2\cdot\dot{\alpha} = 0 \\ & J\cdot\ddot{\alpha} - k\cdot(x_2 + l_1\cdot\alpha)\cdot l_1 - c\cdot(\dot{x}_2 - l_2\cdot\dot{\alpha})\cdot l_2 - k^*\cdot(x_2 + l_2\cdot\alpha)\cdot l_2 = 0 \end{aligned} \tag{1}$$

The new system will order according to the coefficients A*i*, *i* = 1-6 and the harmonics of order 1 and 2 will result (rel. (1)) for each movement of the frame [2] according to the three axes:

$$\text{Frame\_O}_y \begin{cases} A_1 = \left(\dfrac{a_2}{a_1}\right)_1 = \dfrac{-m_1\cdot\omega_{y1}^2 - k}{(k + k^*) + c\cdot\omega_{y1}} \\ A_2 = \left(\dfrac{a_2}{a_1}\right)_2 = \dfrac{-m_2\cdot\omega_{y2}^2 - (k + k^*) - c\cdot\omega_{y2}}{k} \end{cases}$$

$$\text{Frame\_O}_z \begin{cases} A_3 = \left(\dfrac{a_4}{a_3}\right)_1 = \dfrac{-m_1\cdot\omega_{z1}^2 + k}{(-k + k^*) - c\cdot\omega_{z1}} \\ A_4 = \left(\dfrac{a_4}{a_3}\right)_2 = \dfrac{-m_2\cdot\omega_{z2}^2 + (k + k^*) + c\cdot\omega_{z2}}{-k} \end{cases} \tag{2}$$

$$\text{Frame\_O}_x \begin{cases} A_5 = \left(\dfrac{a_6}{a_5}\right)_1 = \dfrac{-m_2\cdot\omega_{x2}^2 + (k + k^*) - c\cdot\omega_{x2}}{c\cdot l_1\cdot\omega_{x2} - (k\cdot l_1 + k^*\cdot l_2)} \\ A_6 = \left(\dfrac{a_6}{a_5}\right)_2 = \dfrac{-J\cdot\omega_{x2}^2 - c\cdot l_1\cdot\omega_{x2} - (k\cdot l_1^2 + k^*\cdot l_2^2)}{c\cdot l_2\cdot\omega_{x2} + (k\cdot l_1 + k^*\cdot l_2)} \end{cases}$$

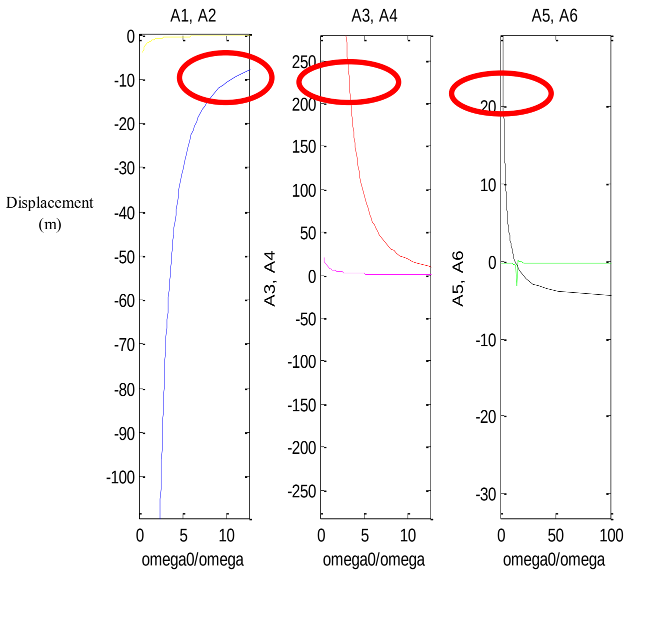
The representation of the graphic solutions of system (1) (A_1-A_6 harmonics of the frame after axes Ox, Oy, and Oz) are shown in Figure 2a-c.

It is observed that apart from the amplitude A_6 at the beat (A_6 = 111.84 s^{-1}), along the Ox axis, which does not come dangerously close to the pulsation of the system (*f* = 104. Hz), the other harmonics of the second-order (A_2 and A_4 represented with bold in Table 2) produce values that are in the close area of resonance. The lower the ratio ω0/ω, the amplitudes are lower, these are preferably A <1, and the exact multiple of integer values we found are peaks of these.

where:

$$\text{omega}_0/\text{omega} = \omega_0/\omega \tag{3}$$

Solving system (1) will lead to the harmonics solution given to us in Table 2 (for the rotation *n* = 1000 RPM and frequency *f* = 104.66 Hz).

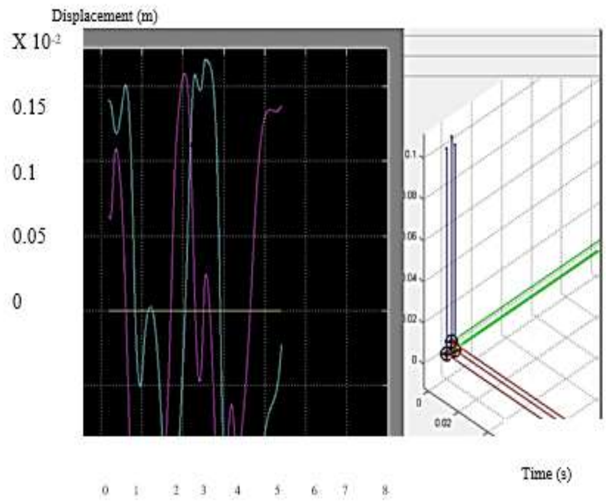


a. b. c.

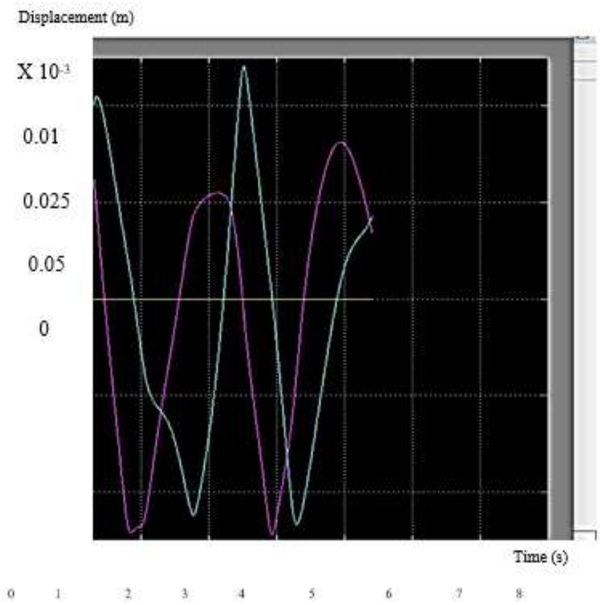
Fig. 2: Harmonic amplitudes of the frame after axes Oy (a), Oz (b), and Ox (c).

Table 2. Frame Harmonics after Three Axes

The amplitude dumping values of the frame					
Oy		*Oz*		*Ox*	
A_1	**A_2**	**A_3**	**A_4**	**A_5**	**A_6**
69.42	104.63	73.57	**103.95**	53.4	**111.84**
($A_2/A_1 = 1.50$)		($A_4/A_3 = 1.41$)		($A_6/A_5 = 2.94$)	



a. Displacement actual Frame.



b. Displacement frame simulates.

Fig. 3: Displacements frame (8 seconds) before and after mass center alignment of a frame after axes. a. Before Oz – yellow; Oy – blue, along of frame; Ox - purple; b. After simulation: Oz – yellow; Oy – blue, along of frame; Ox - purple.

All Simulink blocks respect the mechanical scheme from the simplified mathematical model (Table 2), shown in Figure 1, and all parameters of elasticity, damping, and masses are by the reality given by the equipment and its technical book.

- The purple curve decreases and dampens from $0.15x10^{-2}$ to $0.05x10^{-3}$ m, compared to the chaotic movements of the initial frame model (Figure 3a);
- The blue curves after the Oy axis are strongly damped up to 0.01×10^{-3} m.

The graphs of Figure 2 present the 1st and 2nd-order frame harmonics, according with input dates of the Table 3, except for one 2nd-order harmonic along the Ox axis (black) that probably produces frame rotations, which is another problem of frame vibrations and cracking in the engine area.

These studies must validate the next step regarding the reduced frame vibrations, for example, the simulation studies of the mathematical model in Simulink from Matlab.

Table 3. Input Dates in Conformity with Figure 2, [2]

<table>
<tr><th colspan="4">Parameters and mechanical characteristics, input dates</th></tr>
<tr>
<td>m_{1_upload} sieve = 560 kg

m_{2_frame} = 2460 kg

m_{3_legs} = 500 kg</td>
<td rowspan="2">$k_{\_lamella}$ = 8240 N/m^2

(184 lamellas, equal on two strings);

$k^*_{\_legs}$ = 8240 N/m^2</td>
<td>$c^*_{\_legs\ rubber}$ = 6250 Ns/m</td>
<td rowspan="2">Eccentric engines are arranged symmetrically under the frame (Figure 1)

F_{0_total} =48500 N (excitation force)

α = 20° (vibration transmission angle, direction of excitation after transmission perpendicular to the lamellas);</td>
</tr>
<tr>
<td>$\omega_{\_system} = \omega$
ω_0 = 0:250 rad/s

Owner frequency:
$\omega_0 = \pi$ n/30</td>
<td>Initial condition:

$y_0 = 0$,
$v_0 = 0$</td>
</tr>
</table>

It can be seen that, in Figure 3a, purple curve, the displacements in the frame are random as well as those in the sieve (blue curve), unlike Figure 3b where they stabilize. The frame displacements are stabilized (violet curve) after passing through the transient period, as well as at the sieve (ciel curve), returning to the sinusoid shape.

Studies on the vibrating table through model simulation.

3.2 Studies on the Vibrating Table through Model Simulation

The following values result in a theoretical simulation according to the graphs in Figure 4, and all this is obtained through Simulink modeling in Matlab, respecting the input data of the mechanical model: elasticity (k) and damping (c) constants, excitation forces, and connections between the component elements (springer = lamellas and damper = rubber), etc. of the real model.

It can be seen from Figure 3b that the displacements of the frame have harmonized to some extent, particularly after Oy (blue) and Ox (purple) axes:

All this harmonization is due to the centering on the same vertical axis after the Oz axis of the centers of mass (frame and sieve). In comparison with the design initially used for the cracked vibrating table.

Figure 3a-b, shows the elasticity coefficient of the elastic lamellas has been changed, i.e. their number has been reduced from 144 (initially) fixed in two rows to 96 pieces. This reduces the elastically coefficient k = 8240 N/m^2 (Table 1) until k = 7860 N/m^2 (according to the technical book of equipment, the minimum is 48 pieces on two rows for a standard length of a vibrating table). The excesses of the frame after the three axes are balanced sinusoidally, with a phase shift for the axis Ox, which dissipates over time (purple).

4 Solutions of Research at Vibrating Table

The paper tries to highlight the occurrence of the risk zone in the frame from the "VISO" vibrating table or even in its entirety through simulations performed on two different materials, one given by the manufacturer and another reselected for our study in the FEA simulation, performed with the SolidWorks software, [9].

Compare will also be made between the static and dynamic loads of the "VISO" table or strictly just at the frame.

4.1 Static Simulation FEA

4.1.1 Frame

To redesign the "VISO" vibrating table, one must first understand its behavior, the way it was designed, and the understanding of the reason for the appearance of cracks in the frame (3) from the design point of view, [1], [2], [3], [4], [5], [6], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19].

Therefore, the components and materials of the vibrating table were analyzed (Figure 1):

- (1) thickness of sieve's material: 6 mm thick steel plate;
- (2) lamellas material: carbon fibre;
- (3) frame's material: steel sheets for 6mm tools arranged in three layers in the redesigned version and two layers in the initial version on each side of the frame;
- (4) engines under the angle of 25 degrees (not shown in the paper), only the support on which they are fixed and having the same material as the frame.
- Other components: the vibrating table legs (not presented in the paper). It is recalled that the construction method of the vibrating tables in the specialized literature, [1], [2], [12], [16], contains the same components, but their size, especially related to the length, is much smaller (2-4 m). Therefore, the vibrating table under study, because of the shape of the hall where it is mounted and the working conditions, it was necessary to adapt to an atypical length (L=10m) and the atypical shape, a fact that also led to the problems that appeared (cracks in the frame).

Static studies of the movement of the frame and the vibrating table were carried out from the point of view of displacements, knowing that the force transmitted by the two eccentric engines (4) (2110N, for both engines) is perpendicular to the group of lamellas (2) that fix the sieve (1) on the frame (3).

The paper will present the method of static simulation of the vibrating table "VISO" already used in the production process, the one that cracked, in comparison with a redesigned one, as follows:

- At the real vibrating table (Figure 9) in the simulation, the shape, dimensions, and excitation given by the engines were preserved; it has a frame made of S185 steel sheets with a thickness of 6 mm, placed in two layers on one side and the other of the frame so that the thickness of sidewalls is 12 mm. There are 77 holes for attaching the carbon lamellas in the frame, those located on either side of the frame in this sidewall, and the redesigned vibrating table (Figure 1). To redesign the vibrating table the shape, dimensions and excitation given by the engines have been preserved. Therefore the frame was built from another material, namely: plain carbon steel plates with a thickness of 6mm, placed in three layers on one side and the other of the frame, so that its lateral thickness is greater than the initial one, respectively 18 mm, slightly increasing the total mass of the frame from 2550 kg to 2650 kg. Therefore, it was one of the ways to strengthen it. The holes for attaching the carbon lamellas in the frame, those located on either side of the frame, have been reduced from 77 to 48, of which they can be used to complete with lamellas on one side of the frame between 24 and 48 pieces, in depending on the displacement movement (in centimeters) desired at the sieve.

We remind you that the company that uses the vibrating table "VISO" requested that its length, width, and shape not be modified in any way, but to try, to find solutions to solve the cracking of the frame in other ways. Taking into account, these requirements, it opted to reduce the number of holes for the carbon lamellas between the sieve and the frame, in the scope of stiffening of it, especially in the area of the engines. In this way was avoid the frame material fatigue caused by vibrations, as evidenced through the theoretical and simulation studies, and the new displacement of the sieve is sufficient and with a smaller number of carbon lamellas than those used by the actual mass, bringing displacements in the sieve from 3-10cm).

Thus, Figure 4 (static simulation in FEA), [2], [15], [16], [17], [18], [19], shows the already designed and statically simulated frame from the point of view of displacements.

In Figure 4 and Figure 5, after the static simulation of the designed frame of the "VISO" vibrating table, two risk areas can be observed as follows:
- Zone 1 – does not show interest in studying the paper because the cracks appear in the engine area;
- Zone 2 - is the zone where cracks appeared in the frame, during operation, knowing the transmission force of the engines and the movements of the sieve up to 10 cm (to transport and sort vegetables and fruits).

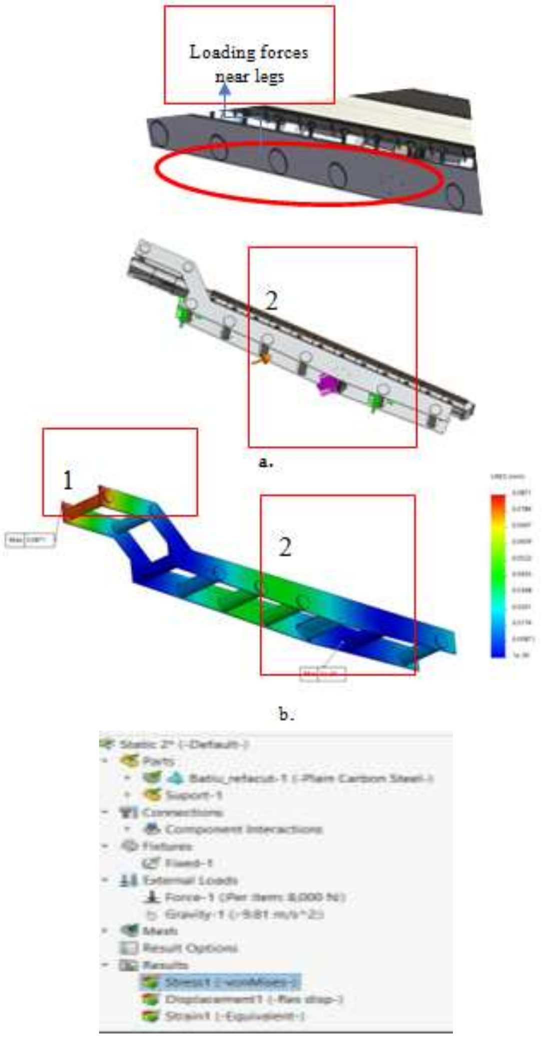


Fig. 4: a-b. The behavior of the initially designed frame and the risk areas for the material chosen by the designer (Plain carbon steel). c. Choosing the characteristics of the frame material as close as possible to reality.

Therefore, although from the simulation the displacements on the frame in the engine area appear quite small, the cracks in reality contradict this fact.

How we improve these aspects:

In these conditions, try to redesign the frame with other materials, but respect the reduction the optimal total mass, and not least, respect the shape of the frame.

a.To change the frame's materials with (Steel alloyed 16NiCr4);

b. It works with the same number of lamellas and keeps the material chosen by the initial designer (carbon fiber) (in the paper 24-48 lamellas on one side, compared to the one designed with a maximal 77 lamellas on one side, in addition, the lamellas of the redesigned table are equally spaced along the length of vibrating table).

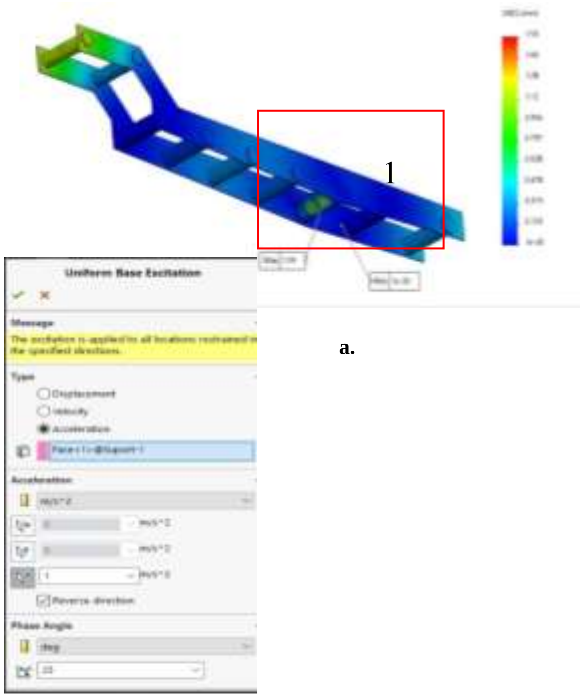
Therefore, although from the simulation the displacements on the frame in the engine area appear quite small, the cracks contradict this fact.

The vibrating table is redesigned with the dimensions given by the first designer, the voids in the materials are respected to reduce the total mass, and finally, the shape of the frame is respected.

a. It is to change frame materials with (Steel alloyed 16NiCr4).

b. It works on the number of lamellas and to keep the material chosen by the initial designer (carbon fibber) (in the paper 48 lamellas on one side, compared to the one designed with 77 lamellas on one side, in addition, the lamellas of the redesigned vibrating table are equally spaced along the length 10 m along vibrating table).

How we improve these aspects:



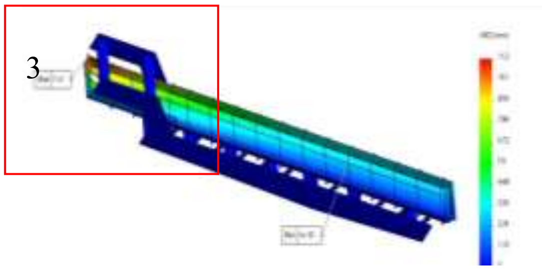
a.

b.

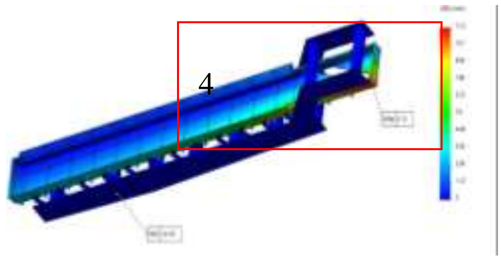
Fig. 5: a. The behavior of the initially designed frame and the risk areas for the material chosen by the designer (Alloy Steel), b. Choosing the characteristics of the frame material as close as possible to reality.

4.1.2 Vibrating Table

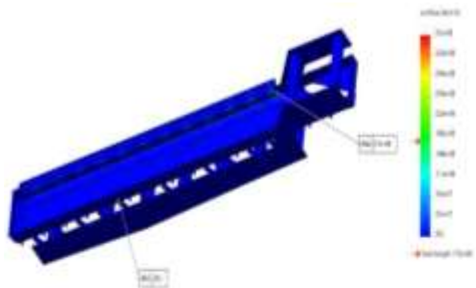
Regarding FEA finite element simulation, it will be analyzed in the first part of the paper through the static analysis (Figure 6) of the vibrating table "VISO" followed by the dynamic simulation in the second part of the paper, simulations effectuated in SolidWorks 2022.



a.



b.



c.

Fig. 6: The redesigned vibrating table"VISO" and its simulation from a static point of view at the same loads as the original vibrating table

Figure 6 shows displacements of the vibrating table "VISO", redesigned and simulated from a static point of view, as follows:

Figure 6a, the material of the sieve is a 4mm steel plate, displacements (risk areas - zone 3) can be observed on the end of the sieve, where the hole in the sieve allows the sorted fruits and vegetables to fall.

Figure 6b, the material of the sieve is a 5mm steel sheet, displacements can be observed (risk areas - zone 4) on the end of the sieve, where the hole in the sieve allows the sorted fruits and vegetables to fall, these being extended on both side ends of the sieve, but they do not present risk.

Finally, Figure 6c shows the simulation of the movement of the sieve with 6mm thick material (non-existent displacements), which is NOT appropriate for the functionality of the sieve because it must transmit movement, i.e. it has tensions and displacements, but these are not allowed to exceed a certain degree, which can be seen from the material of the initial designer and its redesign with the same material, but of different thickness.

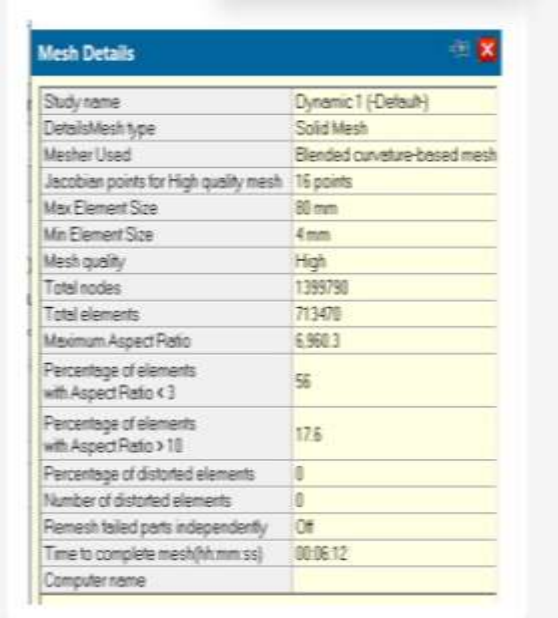
4.2 Dynamic Simulation FEA

Regarding the dynamic (actual) behaviors, the problem of the mechanics of breaking and cracking the vibrating table under dynamic loads and its fatigue behaviors was studied.

All this was carried out by redesigning several sub-assemblies of the vibrating table "VISO", respecting the overall dimensions and the principle of their operation (frame and sieve) as:

• discretization of the frame assembly;
• fixing of loading conditions 2110 N;
• running the analysis;
• realization of a report describing these stages and the conclusions that emerge from the finite element analysis;
• Repeat the steps above for problems that require optimization by material (weight, resistance, safety).

In the study, linear dynamic analysis was considered.



Mesh Details

Study name	Dynamic 1 (-Default-)
DetailsMesh type	Solid Mesh
Mesher Used	Blended curvature-based mesh
Jacobian points for High quality mesh	16 points
Max Element Size	80 mm
Min Element Size	4 mm
Mesh quality	High
Total nodes	1399790
Total elements	713470
Maximum Aspect Ratio	6,960.3
Percentage of elements with Aspect Ratio < 3	56
Percentage of elements with Aspect Ratio > 10	17.6
Percentage of distorted elements	0
Number of distorted elements	0
Remesh failed parts independently	Off
Time to complete mesh(hh;mm;ss)	00:06:12
Computer name	

Fig. 7: Mesh discretization.

In the following, a finite element analysis of the simulation of the vibrating table "VISO" will be made during its dynamic loading (Figure 7a-c), [9], [13], [14], [15]. It is considered that the force that moves to the vibrating table is the same as in the static simulation, namely 2110 N, given by the two eccentric engines mounted under the vibrating table on their support, and its area under the frame is marked with 1.

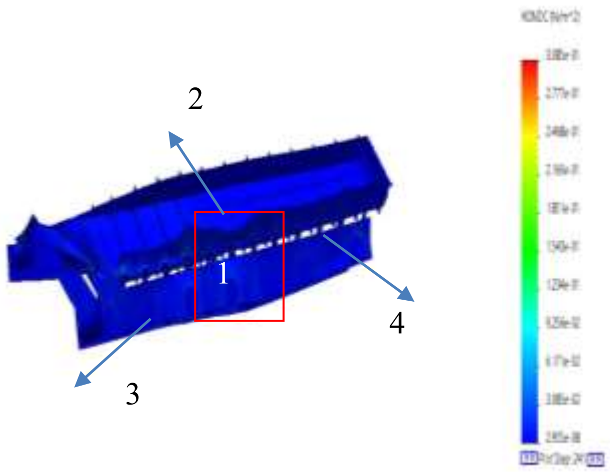
The weight force of the vibrating table is considered into account as well as the loading of the sieve with 650 kg of products, considered the load uniformly distributed on its surface.

Two analyses will be made of the respective dynamic simulation from the point of view of displacements and efforts, as well as the behavior of the vibrating table with two types of materials.

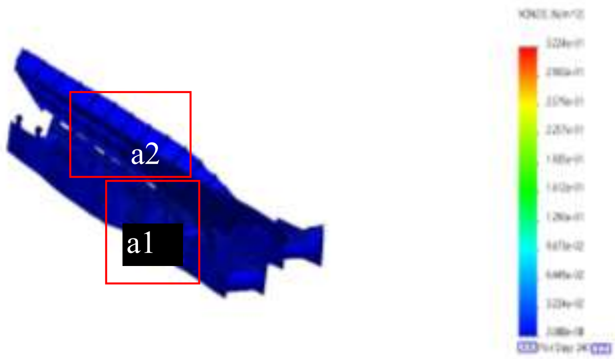
To simplify the model, linear dynamic simulation is considered.

Such as:

- *Material: Plain Carbon steel for the sieve and the frame elements (material 2).*



a. Displacement.



b. Stress.

c. Strain.

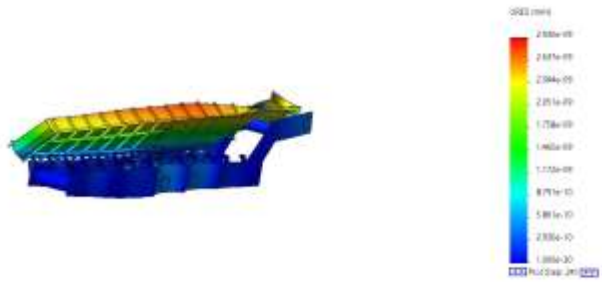
Fig. 8: Dynamic simulation of vibrating table "VISO" – material 1.

From Figure 8a-c, with the Plain Carbon steel material, regardless of the dynamic simulation analyzed as displacement, and stress, there are no areas of risk for the material to fail, especially in the case of the frame, whereas in the actual model at the vibrating table, cracks appeared in the area mounting the engines support. But there are torsional stresses on the sieve (2) compared to the frame (3), which can eventually lead to fatigue of the material and possible cracking of the frame which is connected to the sieve by the elastic carbon lamellas (4).

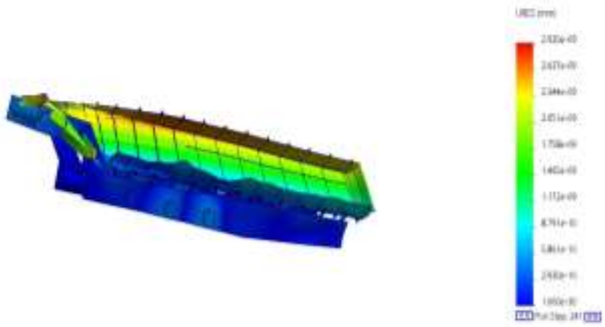
- *Material: Plain Carbon steel (material 1) for the frame and the sieve.*

When choosing a different type of material for both the sieve and the frame (steel type S185), it can be observed that with the same loads and the same conditions of linear dynamic simulation both elements (sieve and frame), but especially for the sieve, risk areas appear. We denote the risk area of the frame with a1 and of the sieve with a2, as follows:

- *Material: S185 steel (material 2)* for sieve and frame



a. Displacement



b. Stress.

Fig. 9: Dynamic simulation of vibrating table "VISO" – material 2.

It can be seen from Figure 9a that there are dangerous areas when choosing the second type of material, especially at the sieve, but there are also problems around the engine areas (a1). The displacements regarding the sieve are understandable from the point of view of displacements because this is its role, and from the legend the lateral displacements, although it is in the risk area, are well below 1cm (0.0234cm). However, the appearance of small displacements in the frame (area a2) can be observed, although they are small (0.0251cm), and could cause fatigue of the material over time.

With this type of material 2 (S185 steel), it is observed that in the stress zone, especially at the sieve, but also at the frame, stresses appear, which, although they are not yet in the risk zone (orange-red), can in time weaken the frame (2).

Consequently, if one had to choose a material for the dynamic behavior of the vibrating table, which is also the most important, from the two analyzed for the frame, one would opt for Plain Carbon Steel (material 1), and the sieve (S185).

The comparison of these materials with those chosen by the designer and the manufacturer (Alloy steel) of the vibrating table “VISO” is different from the point of view of the material, maybe this was the reason for the cracking of the vibrating table frame for “VISO”.

5 Conclusions

From the static analysis, important aspects can be observed, related to displacements (dangerous areas on the structure) and their deformations. Knowing these aspects, the engineer can intervene and take measures so that the structure withstands the demands and fulfills its functional role in optimal conditions. Thus, the study focused on improving the properties of the materials used in the building of the vibrating table. This study sought to determine the immediate displacements and deformations that the mass undergoes for subsequent structural analysis.

It is known that any assembly subjected to repeated stress can accumulate stresses that will eventually lead to its failure, even if the loading does not approach the material's strength limits. Fatigue analysis allows the visualization of deformations due to cyclic loading, and this can prevent when and where deformations may occur and thus predict areas of risk or cracking of the frame.

• The sorting vibrating table works on the principle of vibrations given by the eccentric engines and by moving the sieve (1), they produce the sorting.

• The vibrating table "VISO" is atypical due to its shape and large size (L=10m), this fact led to the problems that arose.

• The type of material and its thickness influence the static and implicitly the dynamic behavior of the vibrating table "VISO", a fact shown in the paper.

• The number of lamellas (2) that connect the sieve (1) to the frame (3) and their arrangement along the frame, respectively even number, symmetrical or asymmetrical arrangement, influence the behavior of the vibrating table "VISO".

All these corroborate lead or not to the optimal and sustainable mode of operation of the vibrating table "VISO".

In the paper, [1], the behavior of the vibrating table "VISO" was specified from a theoretical point of view to the action of vibrations, the present paper continues this study with the redesign of the vibrating table. The new analysis given by the paper specifies long-term aspects, so that the vibrating table must be out of production and this involves financial expenses.

6 Discussions

It will desire to create a simpler prototype of the vibrating table "VISO" that validates the correct operating principle given by the static and dynamic FEA simulation in SolidWorks and to perform vibration measurements on this prototype for at least one week.

The measurements will be satisfactory if their daily average remains constant throughout the week, otherwise at least one component of the vibrating table assembly will be modified, and it will begin with the arrangement and modification of the power of the exciter engines located under the frame, then changing the materials on the frame and finally in the sieve, too.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

- Aurora Felicia Cristea – Conceptualization paper, writing review, editing, visualization, supervision.
- Monica Carmen Bălcău – Validation, resources, writing – original draft preparation.
- Simion Haragâş – Methodology paper.

All authors have read and agreed to the published version of the manuscript.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

No funding was received for conducting this study.

Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.