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THE POSITION OF VIBRATING MECHANISM CENTER MASS AS A FACTOR OF INFLUENCE ON SCREENING

Stoicovici D.I., Dr. Eng., Lecturer, Ungureanu Miorița, Dr. Eng., Assoc. Prof., Crăciun Ioana, Eng. Lecturer, North University of Baia Mare, Dr. V. Babeş str., Nr. 62, Baia Mare, RO – 4800, Romania

Abstract: *This paper presents some aspects regarding the influence of some supplementary factors, in order to obtain the most favorable vibration operating conditions in the case of screening critical humidity material, using an experiment on usual inertial vibrating screen. The critical humidity material has its particles under 10mm nominal dimension that have humidity in between 5% - 14%. In experiment is underline the case when the vibrating mechanism center mass is not overlapping perfectly on the vibrating box center mass. Finally, a technical design recommendation is given to avoid the inconveniences in this case.*

Key words: *vibrating screens; critical humidity; center mass position influence.*

1. INTRODUCTION

There are some parameters that have important influence on a good functioning of the vibrating screens [1]. Those factors are usually considered on finding the optimal vibrating regime (such as frequency, amplitude, throwing coefficient, [2], [3]). The particular optimal values of those factors are depending on the particular building solutions of the screens (gyratory screens, inertia screens and auto swinging screen). Besides those dynamical and kinetic factors, there are some supplementary factors that are depending on the building defectives and functioning malfunctions, such as:

- the influence of the quantity of the material that is on the surface of the sieve;
- the influence of the mobile box building and assembling defectives;
- the influence of the necessity of the limiting of the dynamical regime because of the important inertia forces that are occurring during the vibrating movements;
- the influence of the incorrect stretching of the sieves;

For those factors it is very difficult to find mathematical relations to define them and to control their influence on the vibrating regime [4]. Still their bad influence is very important and often the evolution is in cascade, especially in the case of screening materials with critical humidity (that is particles grading under 10mm and humidity in-between 5%…14%), when the sieve blinding occurs very rapidly, often in a matter of minutes. For

avoiding all that, one must rely especially on his own experience to solve particular problems for each screen. Further on, this paper will show an experiment carried on by the author, in order to quantify somehow the influence of a wrong position of the vibrations generator on the screen mobile box.

2. THE INFLUENCE OF A WRONG POSITION OF THE VIBRATIONS GENERATOR ON THE SCREEN MOBILE BOX

One of the wrong positions of the vibrations generator is when the vibrating mechanism center mass is not overlapping perfectly on the vibrating box center mass. In this case, a supplementary disturbing movement is occurring, that is the balance of the screen (pitching) as shown in *Figure 1*.

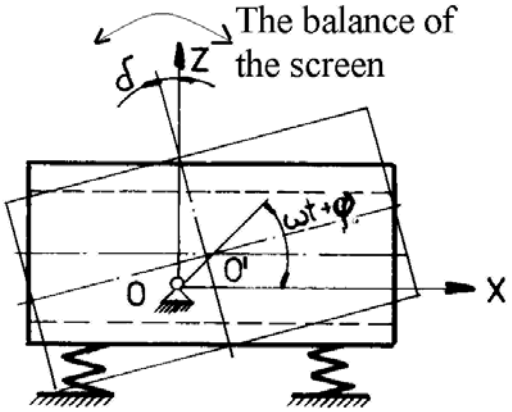

Figure 1:The distorsion movements of the screen

When this movement is occurring, there is also the possibility to have some "zero amplitude" points on the surface of the sieve. In those points the material has the tendency to jump over the same place again and again, or to stay there. Either phenomenon has as result the conglomeration of the material on the sieve as shown in *Figure 2*. In this figure, the point N is one with zero amplitude.

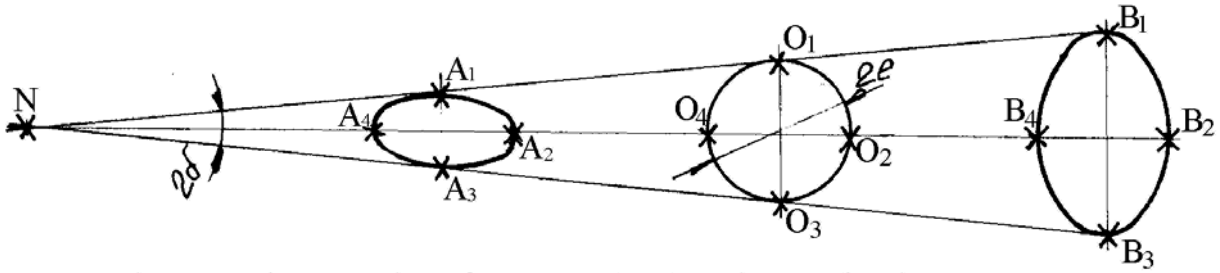

Figure 2: The occurring of "zero amplitude" points on the sieve

3. METHODS AND RESULTS

In order to highlight the supplementary disturbing movements because of the wrong position of the vibrating machine center mass, an experiment was done. The purpose was to measure the influence of the wrong position of the vibrating machine center mass on the screen amplitudes.

The experiment was done on a 2 square meter surface screen as seen in *Figure 3*. The calculated amplitude was 10mm. The real amplitudes were measured on the points ❶ and❷. The four directions of measurements were A-A, B-B, C-C, and D-D, as showing in Figure 5. There was calculated the exact position of the vibrating box center mass, and than was establish the differences between them and the vibrating mechanism center mass:

- There was a difference on horizontal direction equal with 123mm directed to screen feeding end;
- There was a difference on vertical direction equal with 120mm directed to the up of the screen.

The real position of the vibrating mechanism is showing in Figure 4. Also, in this figure one can see the real path (the geometric locus) of the momentary center of the rotation.

The values of the amplitudes measured in the points ❶ and❷ are compared with the amplitude values of the mobile box center mass in *Table 1:*

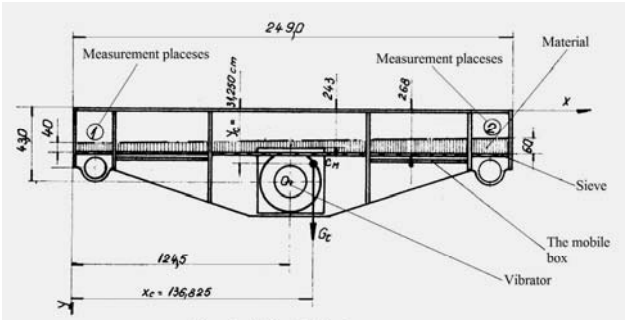

Figure3 : The inertial vibrating screen

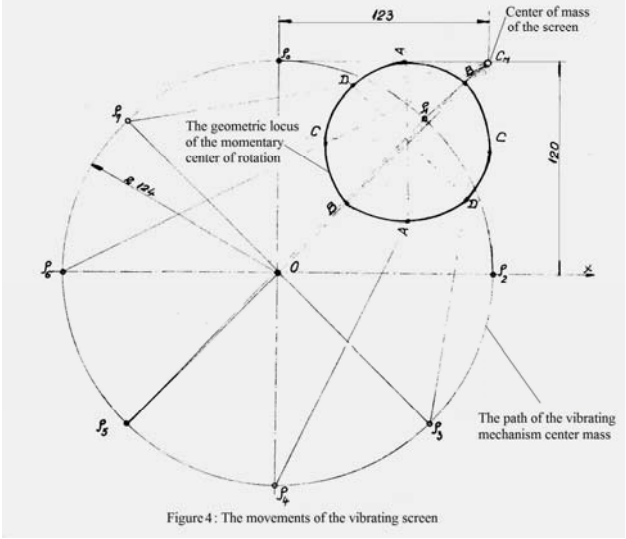

Figure 4 : The movements of the vibrating screen

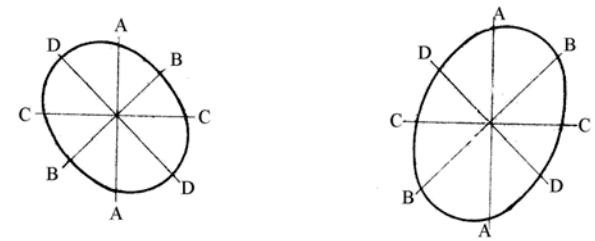
Figure 5: The directions of measurements and the path of point1(left) and 2(right)

Table 1: The values of the amplitudes in points ❶ and❷

Direction of measurement	The amplitude value of the mobile box center mass [mm]	The amplitude value in point❶ [mm]	The amplitude value in point❷ [mm]
A – A	**9,2**	**8**	**8**
B – B	**9,7**	**8**	**6,9**
C – C	**9,2**	**6,7**	**8**
D – D	**9**	**6,5**	**6,7**

4. CONCLUSIONS

- The differences between the amplitudes in points ❶ and❷ are because of the balance movements (pitching) of the mobile box;
- The differences represents a decrease with an average of 20% of the calculated ones;
- The maximal value of the amplitudes is with 25% less than the calculated amplitude also because of the bigger quantity of material on the screen than the normal one;
- The smaller amplitudes have as results the conglomerations of the material and a bigger mass to vibrate, so the amplitudes become even smaller, and so on.

We recommend in conclusion that, at inertia vibrating screens, the distance between the horizontal axis of the vibrating mechanism and the parallel axis that is passing through the mobile box center mass must not greater that 20% of the amplitude calculated for the vibrating mechanism, in order to diminish the bad influence of pitching on the dynamical behavior of the screening and the quality of the screening.

5. REFERENCES

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