THE ANNALS OF "DUNAREA DE JOS" UNIVERSITY OF GALATI
FASCICLE XIV MECHANICAL ENGINEERING, ISS 1224-5615
2006

THE EXPERIMENTAL ANALYSIS OF DYNAMIC PARAMETERS TO THE VIBRATING SCREEN WITH FUNCTION IN RESONANCE

Asist. drd. ing. Valentin TONȚ
Uiversitatea "Dunarea de Jos" din Galati
Prof. ing. Daniela-Lidia JÄGER
Scoala generala nr. 2, Fagaras

ABSTRACT

In this paper is presented the method of experimental analysis for establish the dynamic parameters to the vibrating screen, with function in resonance.

1. Introduction

The vibrating screen with function in resonance is maked by: superior frame, inferior frame, balancer, elastic group of the eccentric rod, driving shaft, elastic group for coupling, support.

Screens are in the inferior and superior frames. It must be to achieve the vibrating level to the direction of the eccentric rod under entering angle who's formed these whith the orizontal position.

For maintain the operating conditions in resonance, it was adopted the constructif system with the eccentric rod and for perturbation with eccentric bush fixed to driving shaft.

In this paper are present the next dynamic parameters of the vibrating screen with function in resonance: rigidity coefficients, damping factors, vibrating mass.

2. The experimental analysis

The rigidity coefficients was establish both for the elastic group of eccentric rod and for the elastic group of the couplings tooth the superior and inferior frame.

Thus, depending on the number of elements rallyed in parallel, we have:

$$\begin{aligned} k_0 &= k \cdot s_0 \\ k_1 &= k \cdot s_1 \end{aligned} \qquad (1)$$

when: k_0, k_1 are the rigidity equivalent coefficients to the elastic group of the eccentric rod and for the couplings group;

s_0, s_1 -the number of the rubber elements rallied in paralel of the elastic groups;

k - the rigidity coefficient to one rubber element.

The coefficient k is established through tests to a group by 50 pieces rubber elements, through recording of deforming steps for shearing strain. Thus, for one parallelipipedic element with size 160×125×65 mm, by rubber SAB 31 with hardness 45° Sh A, after tests, on obtained the value $k = 178 \cdot 10^3$ N/m.

The total number of elements to the group is

$s_0 = 2 \times 8 = 16$ pieces for eccentric rod and

$s_1 = 8 \times 4 = 32$ pieces for group of the couplings.

The rigidity equivalent coefficients are:

$k_0 = 2848 \cdot 10^3$ N/m and $k_1 = 5696 \cdot 10^3$ N/m.

The mass of the movable elements, in vibrating movement, make by the total mass m_1, of superior frame and total mass m_2 of inferior frame. Experimental was obtened: $m_1 = 1450$ kg and $m_2 = 1680$ kg.

Dumpind factors was established using the method of the system answer to the free vibration.

The logistic decrement of the moving system, formed at s rubber elements rallyed in parallel, is:

$$\Delta_{p\ sist} = \frac{1}{j-1} \cdot ln \frac{x_1}{x_j}, \qquad (2)$$

where: x_1 is the limit moving of system,

considered to the initial moment $t_1 = 0$; x_j - the limit moving of system to the moment t;
j - the serial number of the limit moving of system.
The logistic decrement of the moving for one rubber element Δ_1 is: $\Delta p\ sist = \Delta_1 \cdot \sqrt{s}$, which s is total number of the rubber elements rallied in parallel.
For a system formed by s' = 32 elements rallied in paralel, on have:

$$\Delta'_{p\ sist'} = 0,63$$
$$\Delta_1 = \frac{\Delta^{sist}}{\sqrt{s}} = 0,11. \quad (3)$$

The angle of interval loss δ who reflect the dissipation of energy is:

$$tg\delta = \frac{D}{\pi}. \quad (4)$$

For the antivibrating system formed by s' = 32 elements: $\delta'_{sist} = arctg\frac{\Delta'_{sist}}{\pi} = 0,198$ rad.
In the case of the total antivibrating system, formed by s = 48 elements, on have:

$$\Delta_{p\ sist} = \Delta'_{p\ sist} \cdot \sqrt{\frac{s}{s'}}. \quad (5)$$

So, for the vibrating screen with function in resonance, who has 48 antivibrating rubber elements, we have: $\Delta_{p\ sist} = 0,77$ and $\delta_{sist} = 0,24$ rad.
The angle of loss δ_1 for one antivibrating element will be $\delta_1 = 0,035$ rad.

3. Conclusion

The methods of experimental investigation to the parameters cover the necessary of dates for established the performances of vibrating screen with function in resonance.
Following the theoretical dates and experimentally it was established the gravel relation and the testing methods for vibrating screens with function in resonance.

4. References

[1] **Bratu, P.,** *Dinamica ciurului vibrator bimasic cu functionare in rezonanta*, St.cerc mec. Apl. 47, 6, 1988.
[2] **Munteanu, M.,** *Introducere in dinamica masinilor vibratoare*, Editura Academiei. Bucuresti, 1986.
[3] **Rades, M.**, *Metode dinamice pentru identificarea sistemelor mecanice*, Editura Academiei, Bucuresti, 1979.