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THE IMPACT OF THE TECHNOLOGICAL EQUIPMENT VIBRATION ON THE ENVIRONMENT

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ABSTRACT

The shocks & vibrations generated by the operation of such tools, are conveyed to the foundation environment affecting both the near – by building safety and the comfort of the unit personnel and of the surrounding building inhabitants. In this paper is presented the real situation of the production process of the forging hammer. The effects of vibration on the technological equipment and also environment will evaluate.

1. Introduction

Forging hammers cause very high vibration levels, so vibration control is advisable in nearly all cases. This is especially true:

- if nearby residents must be protected against hammer vibrations
- if the soil has a limited bearing capacity
- if furnace or other sensitive machinery and equipment in the shop or in the vicinity must be protected
- if the effects of hammer vibrations on people around the forge must be reduced
- if neighboring buildings are in danger of being damaged by hammer vibrations.

The vibration transmitted from hammer not only caused problems in the metalformer of quality control room, but also at a neighboring company [2].

2. Experimental study

This work presents the result of the experimental determinations make on forging hammers (1250kg capacity) at Tool & Devices Factory (IUS –Brasov, Romania).

The dynamical behavior of the technological equipment and the characterization of vibration transmitted to environment can make trough three kinematical parameters displacement, speed and acceleration, as well as spectral analysis of the foundation displacement [3]. For the determination levels of vibration transmitted from the considered sources - forge shop, to environment was effectuated measurements of the vibration levels:

a. At source for two point for measurements: bed plate and vat;
b. At source for two point for measurements: bed plate and foundation.

These measurements give the possibility to evaluate the damping level of the viscous-elastic system between foundation and the vat. Measurement of bed plate and foundation are presented in the Figure 1-4 as follow:

- in the Figure 1 is presented the time history of acceleration and spectral response measured on foundation; maximum acceleration in the area: 20...25 Hz.
- in the Figure 2 is presented the power spectral density of acceleration response measured on foundation, with the maximum in the 24Hz point.
- in the Figure 3 is presented the time history of acceleration and spectral response measured on the bed plate; maximum acceleration in the area: 6...9 Hz.
- in the Figure 4 is presented the power spectral density of acceleration response measured on the bed plate, with the maximum in the 24Hz point.

Measurement of bed plate and vat are presented in the Figure 1-4 as follow:

- in the Figure 5 is presented the time history of acceleration and spectral response measured on the vat; maximum acceleration in the area: 18...22 Hz.

- in the Figure 6 is presented the power spectral density of acceleration response measured on foundation, with the maximum in the 56Hz point.
- in the Figure 7 is presented the time history of acceleration and spectral response measured on the bed plate; maximum acceleration in the area: 6...9 Hz.
- in the Figure 8 is presented the power spectral density of acceleration response measured on the bed plate, with the maximum in the 24Hz point.

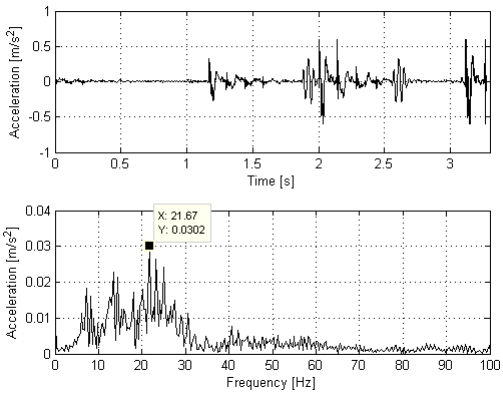

Figure 1 Time history of acceleration and spectral response measured on foundation

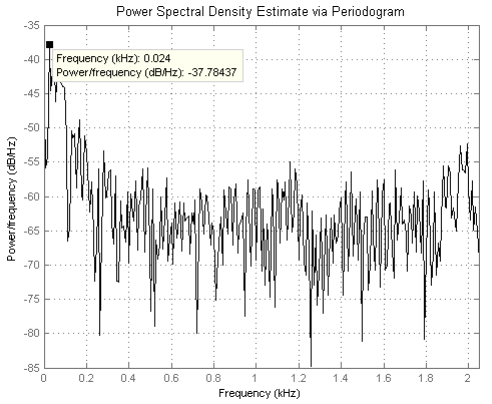

Figure 2 Power spectral density of acceleration response measured on foundation

3. Conclusions

The most relevant vibrations for the impact of the environment are vibration propagated from the vat Figure 5, 6. From the Figure 5, we observe that maximum acceleration is 10cm/s^2 at 21.36 Hz frequency, so by rule of evaluation criteria from acceleration point view, the neighbor building will not suffer significance damage (R. Cieselski diagrams) [1].

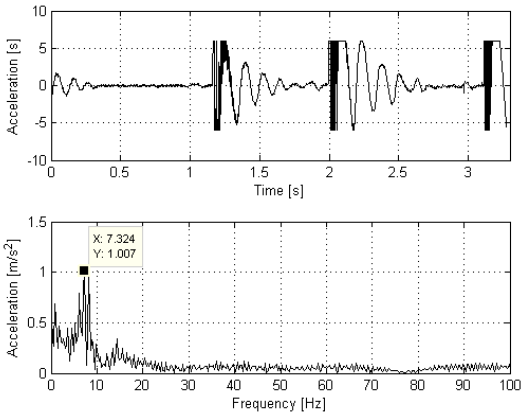

Figure 3 Time history of acceleration and spectral response measured on the bed plate

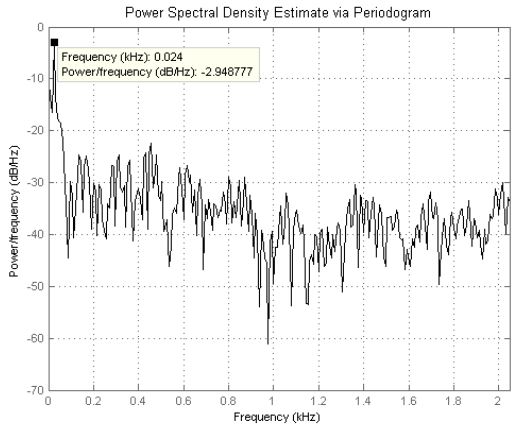

Figure 4 Power spectral density of acceleration response measured on the bed plate

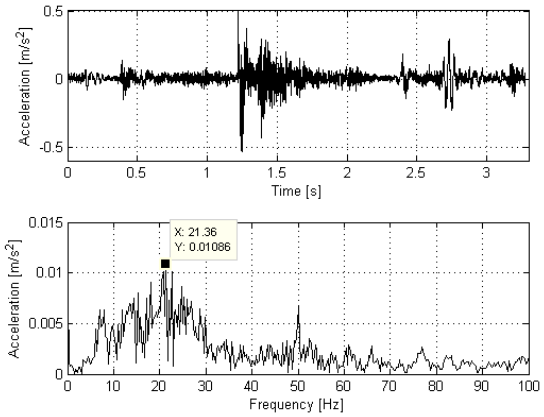

Figure 5 Time history of acceleration and spectral response measured on the vat

The integral of the power spectral density over a given frequency band computes the average power in the signal over that frequency band Figure 6, with maximum in 56 Hz point.

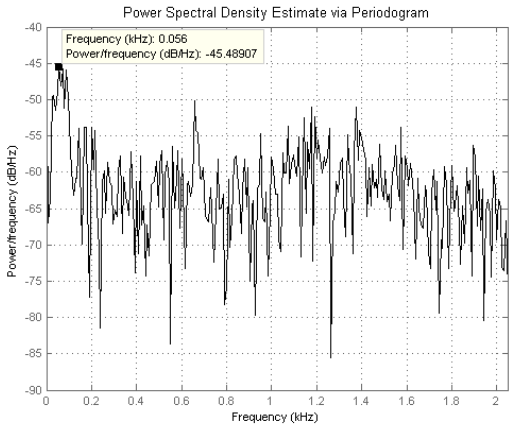

Figure 6 Power spectral density of acceleration response measured on the vat

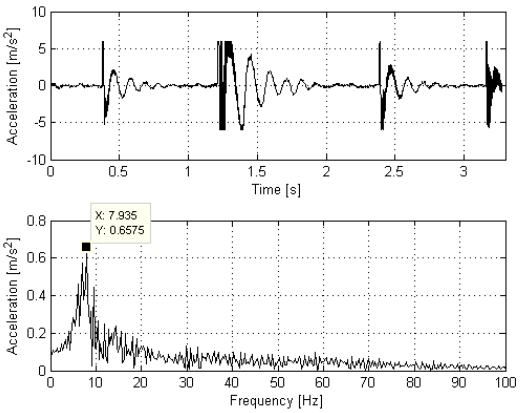

Figure 7 Time history of acceleration and spectral response measured on the bed plate

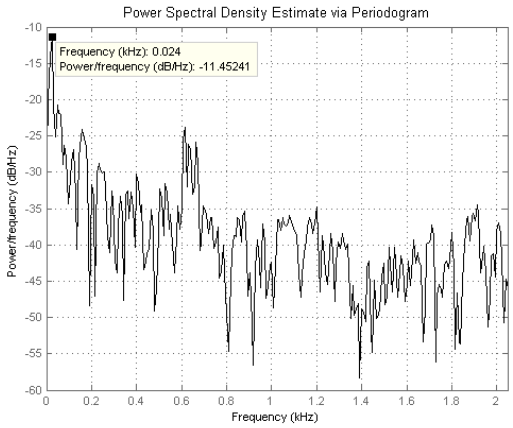

Figure 8 Power spectral density of acceleration response measured on the bed plate

Base on these procedures are caned caused as much "signature" quotient and "mark" of the technological equipments which work with the shock and vibration, caned estimates thus, the impact of industrial sources about human and constructed environment.

References

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