Structural Damping of Mechanical Vibration

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Mechanical vibration is undesirable in the majority of cases. It can have a negative influence on accuracy of manufacture, service life of processing equipment and tools, labour protection, human health and so on. Excessive noise belongs to the accompanying phenomena of the mechanical vibration too. For these reasons it is necessary to eliminate mechanical vibration in an appropriate manner. There are different possibilities of vibration damping. Application of suitable materials with damping effects belongs to these possibilities. This paper is focused on structural damping of materials. Damping properties of different materials were experimentally measured and subsequently evaluated by means of the forced oscillation method. It was found that the vibration damping depends not only on the material type but also on material density and thickness, excitation frequency and mass load.

Keywords: Forced Oscillation, Transfer Damping Function, Frequency, Thickness, Inertia Mass.

References

[1] FIALA, Z., JAROS, A., SEDLAK, J., KOLAR, L., BLAZKOVA, V. (2015). Effect of Spindle Unit Extrusion on Stability of Machining Process. In: *Manufacturing Technology*. Vol. 15, No. 3, pp. 329–333. Elsevier. Netherlands.

[2] KLIMENDA, F., SKOCILASOVA, B. (2015). Rollers Vibration of Pipe Conveyor. In: *Manufacturing Technology*. Vol. 15, No. 6, pp. 991–995. Elsevier. Netherlands.

[3] FABIAN, S., SALOKYOVA, S. (2015). Measurement and analysis of mass flow and abrasive sieving impact on technological head vibrations during cutting abrasion resistant steels with abrasive water jet technology. In: *Manufacturing Technology*. Vol. 15, No. 1, pp. 20–24. Elsevier. Netherlands.

[4] XU, J., GU, L., LUO, S. (2014). Dynamic Analysis for High-speed Cutters of Five-axis CNC Milling Machine. In: *Manufacturing Technology*. Vol. 14, No. 4, pp. 643–650. Elsevier. Netherlands.

[5] SMETANA, C. et al. (1998). *Hluk a vibrace. Měření a hodnocení*. 188 p. Sdělovací technika, Praha (in Czech).

[6] RAO, S. (2004). Mechanical Vibrations. p. 1078. Pearson Education Inc., New Jersey. USA.

[7] STEPHEN, N. G. (2006). On energy harvesting from ambient vibration. In. *Journal of Sound and Vibration*. Vol. 293, No. 1-2, pp. 409-425. Elsevier. England.

[8] BEARDS, C. F. (1996). Engineering Vibration Analysis with Application to Control Systems. p. 426. Halsted Press, New York. USA.

[9] LAPCIK, L., VASINA, M., LAPCIKOVA, B., VALENTA, T. (2016). Study of bread staling by means of vibroacoustic, tensile and thermal analysis technique. In. *Journal of Food Engineering*. Vol. 178, No. 6, pp. 31-38. Elsevier. England.

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