

DERIVATION OF MEAN IMPEDANCE CURVES AS A BASIS FOR MECHANICAL MODELS OF THE HUMAN HAND-ARM SYSTEM

J. Kinne, R. Melzig-Thiel

Federal Institute for Occupational Safety and Health, Department 5, Dresden, Germany

SUMMARY

The use of mechanical models of the human hand-arm system in test stands can substitute man in several activities with exposition to vibration. An example is prototype testing of percussion drills.

Modelling should be based on ascertained mean impedance curves of the hand-arm system. The method chosen was deriving curves for the three directions by using DIN and ISO standards (such as DIN 45677) as well as comprehensive literature and results of own measurements.

At present it can be stated that:

- Literature is scarce especially with regard to the test conditions. Thus the causes of - sometimes largely - varying test results are difficult or impossible to be traced.
- There is conformity with the standards in principle. However, deviations exist for the frequency range determining the a_w -value so that the application of mean standard curves for modelling the hand-arm system can lead to mistakes compared to test persons.
- Literature clearly shows an influence of hand grip force on the impedance curves. Standardisation seems not to consider this influence sufficiently. Mechanical models should take it into account.
- For feed force, there is no evidence for such a clear influence on the impedance curves.

Key words: hand-arm system, mechanical model, impedance, test stand

Address for correspondence: Federal Institute for Occupational Safety and Health, Department 5, Gerhart-Hauptmann Str. 1,
01219 Dresden, Germany