

REDUCTION OF THE VIBRATION OF THE HAND-ARM SYSTEM BY OPTIMIZATION OF ROTARY HAMMER DRILLS

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SUMMARY

When operating a hand-held vibrating power tool, for example Impact drills and rotary hammers, high vibration loads are introduced to the hand-arm system of the operator. In the long run these mechanical vibrations can lead to health problems of the hand-arm system.

Hammer drilling tools for treatment of mineral materials are offered with many different designs of the cutting edge in the diameter range between 16 mm and 50 mm. In this research project the influences of the cutting edge design of drilling tools on the vibration characteristics of rotary hammers are investigated. The vibration exposure of the hand-arm system due to the tool and the volume of chip production are regarded. The gauge being a combination of the weighted acceleration and the drilling capacity.

Based on the current spectrum of drillings tools neutral test have been developed to examine geometrical parameters. Both sets of drill tools have been subjected to the same test programme. The analysis of the results led to the definition of the characteristics of an optimal rotary hammer drilling tool. Lists of criterions have been developed for the different groups of tools. Using these it is possible to create drilling tools optimized for vibration exposure. This was demonstrated by prototype drilling tools. The comparison of the results showed that the averaged volume of chip production could be significantly improved by modifying the design of the drilling tools retaining the weighted acceleration. The comparison also showed that the total vibration severity parameter decreased.

Key words: vibration exposure, hand-guided tool, rotary hammer, drilling tool, cutting edge design

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