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Consideration on the Vibration in Grinding

Ichiro INAZAKI*

The relative displacement between abrasive disk and work in grinding causes waves on the work surface, that is undesirable.

In this paper the author has made some considerations on this problem. In the first chapter the foregoing studies as for vibrations of rotating shafts are regulated, and then the author applies these results into vibrations of spindle of grinding machine. The importance of unbalance of disk and gyroscopic effect in spindle system are recognized. In the second chapter the author observes vibrations in grinding, pays attention to three sorts of vibrations and makes some analyses. Here the regenerative effect is not considered.

(1) Self-excited torsional vibration of spindle ; the author shows possibility of selfexcited torsional vibration of spindle caused by falling charaderistic of tangential grinding force against grinding speed.

(2) Vibration caused by non-uniformity of working surface of abrasive disk ; non-uniform distribution such as loading on working surface of disk gives periodic fluctuations to grinding force, that may cause parametric resonance. Then the author analyses these vibrations and verifies through experiments.

(3) Waves on working surface of disk ; it is presented here that there are considerable waves on working surface of disk. These waves depend on the stiffness of grinding machine. It will be a cause of vibrations.

In the following chapter experimental results of dynamic characteristic of grinding machine are described.

In the last chapter the author has obtained the characteristic equation for determining the natural frequencies of the system which has overhang, that we can see in general spindle system of grinding machine, and compared these results with experimental values.

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