

The Dynamic Analysis and Testing of Feed Drive for Machine Tools

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ABSTRACT

The feed drive system of a machine tool includes the feed mechanism and a NC controller. The feed drive system has large effect on the performance of high speed machine tools. In order to get the enough accuracy of a high speed feed drive system, we must increase the system response and the motion accuracy. To fulfill these requirements, the control system should be reasonably designed. The driving elements and the operating parameters should also be properly determined. In this study, we proposed a measurement technology by using model testing and IBN-TOOLS signal measurement software which is designed by SIEMENS. First of all, we tried to get the equation of motion for feed drive system from Newton ' s law. In order to get the correct transfer function of the system. we also use system identification to analyze the table dynamic response which is caused by the movement of a machine tool. We also proved it by the measurement value. Firstly, we find that the system inertia must correspond to the motor inertia, and the system dynamic properties will be better if both of them are in good operating condition. Secondly, we used the properties of frequency response corresponding to system identification. Then we found the main element which influences the system dynamic properties by adjusting the parameters. Finally we can improve the model by comparing the mathematic model with experimental values.

Keywords : machine tools ; feed drive ; model testing ; system identification

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