



工作機械主軸の立上がり電力を用いたSN比と誤圧による電力パターンの判別

Discrimination of the Electric Power Patterns of Machine Tool Spindles by S/N Ratio and Error Root Mean Square, Using Ramp-up Power

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For a machine tool, the spindle is an essential element in the machining process; sporadic repairs or replacement of the spindle are a factor that directly hurts the machine tool user's productivity, so being able to detect abnormal spindle conditions would be of enormous benefit to both the machine tool user and the machine tool manufacturer. In the present study, accordingly, the power consumption of the motor that turns the spindle was evaluated by using the error root mean square for the purpose of developing a system that could discriminate abnormal spindle conditions before they damaged the spindle. A previous study had indicated that in evaluating the S/N ratio not only the power consumption after the spindle rotation had stabilized but also the part of the power consumption waveform in which the power consumption ramps up abruptly during rotational acceleration should be considered, and that separate spindle specifications would require separate analyses, so these approaches were taken in the present study. As a result, by restricting analysis to spindles with just one specification, waveform discrimination within that specification became possible, but the need for data on spindles with abnormal conditions, which had been an outstanding issue, now became even greater.

Key words : Taguchi methods, quality engineering, S/N ratio, MT system, variation pressure method, milling machine, spindle, electric power, electric power pattern, life time

1. はじめに

工作機械において主軸は加工を行う上で必要不可欠な部位であり、突発的な主軸の修理や交換はユー

ザの生産性を損ねる直接の要因となる。そのため仮に重大な破損に至る前の軽微な異常や出荷検査に掛からない異常を選別できた場合、ユーザ側ではダウンタイムの減少、メーカ側ではサービス業務の負担軽減等、ユーザとメーカ双方にとって大きなメリットを期待できる。そこで本研究では、主軸回転の際に発生するモータの消費電力を誤圧の距離（以下、

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