Public Abstract

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Title: Helical Tool Geometry In Stability Predictions and Dynamic Modeling of Milling

The temporal finite element analysis (TFEA) method has been used in several publications to analyze interrupted machining dynamics and predict stable cutting conditions and surface location error. The cutting process can be optimized and improved when a stable cut with low SLE is achieved. In this work, a higher order hp-version TFEA method will be presented which offers the possibility of lowering computation time. Also, in order to highlight the effect tool geometry has on stability and surface location error in milling, TFEA results that do and do not ignore helical geometry are compared. In addition, simulation and experimental data are presented in an effort to validate TFEA results for machining titanium (Ti6Al4V) using a helical end mill tool. The analytical results show that the tool geometry does effect stability and surface location error, and the TFEA method is not fully validated by the experimental results for Ti6Al4V. The research provides an improvement upon the TFEA method which can be used to improve productivity in the machining industry.