

Pareto optimal velocity profiles for feed drive machines

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Abstract: For feed drive machines, the main task is to track a given contour with high accuracy and speed. However, in the recent years the topic of energy efficiency is also becoming increasingly important.

In general, in a machining task, the contour is fixed and only small deviations are permitted. One approach, therefore, is to use the velocity trajectory on the contour as degree of freedom to reduce the energy consumption. This talk presents a discrete dynamic programming based approach for piecewise linear contours to generate S-curve velocity profile with jerk and acceleration limits. To avoid stopping the corners are smoothed by Bézier spline blending. The approach allows to calculate Pareto optimal trajectories by weighting cycle duration and energy consumption. Results for a biaxial feed drive machine are presented.
