

Contribution for SAMCE 2023

## OpenCN: an open-source CNC with new Trajectory Optimization for high Performance Milling

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Today's commercial CNC's are black boxes with almost no access to trajectory planning. LinuxCNC is open-source, but not suitable for high performance machining because of the lack of jerk limitation. OpenCN overcomes the limitations of LinuxCNC with the following features: efficient geometric  $G^2$  rounding between blocks, jerk control using LP optimization with receding horizon, automatic C code generation for trajectory planning algorithms, and a 10 kHz EtherCAT transmission to the drives using distributed clock. A new framework with real-time Xenomai asymmetric multiprocessing was developed using a recent Linux kernel. A functional validation of OpenCN is carried out on a high performance 3 axis mini-milling machine for work pieces in brass up to F9000 feedrate.

