

Geometric modeling of 5-axis flank CNC machining

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ABSTRACT

Computer numerically controlled (CNC) machining is the leading subtractive manufacturing technology and even though it is an engineering discipline it offers a rich source of challenging problems in geometric modeling and motion planning. Flank, aka peripheral, machining is the finishing stage of the machining process where the tool touches tangentially a to-be-machined surface and in essence it is an approximation problem to represent a given curved geometry by rigid body motions of a rotational surface.

In this talk, I will discuss our recent advances in geometric modeling of 5-axis flank CNC machining. In particular, I will discuss path-planning strategies that consider shape of the tool as an optimization variable [1], multi-strip path planning that aims at high smoothness across the neighboring strips [4], and, on an example of spiral bevel gears, will demonstrate even more efficient variant of flank machining, called double-flank [2, 3].

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