

abstract

Grinding the helical surfaces in end-mill cutters using two-axis CNC machines is well investigated in literature. However, the grinding wheels do not have explicit geometric representations and the produced helical angles differ from the designed values. Moreover, to the best knowledge of the authors, no reliable and robust algorithm exists to grind generic shape cutters with constant normal rake angles. Thus, the first part of this work introduces a five-axis grinding process that keeps the normal rake angle constant along the rake face. The parameters that affect the shape of the tool flutes are also analyzed and studied in this part. These parameters are then optimized in the second part to obtain optimum wheel shapes grinding the tool flutes along optimum paths. Overall, the grinding process proposed grinds the tool flutes with close matching to the designed ones and replaces the complex wheel shapes commonly used by simple prismatic ones.