FORCE PREDICTION MODELS IN BALL END MILLING OF FREEFORM SURFACES

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Abstract

Simulating the process of NC milling of freeform surfaces is of fundamental importance in computer aided manufacturing (CAM). In order to accurately predict cutting force in sculptured surface machining with ball end mill, tool posture, cutting edge, contact state between cutter, and workpiece are studied. Cutting force prediction is very important to optimize machining parameters, monitor the machining state and to reduce the possibility of tool breakage. In order to predict the cutting force of surface machining with a ball end mill, different materials and geometry of the tool/workpiece are studied. In this paper, the state of the art is presented in the field of force prediction in ball end milling and the advantages of different methods for determining the cutter-workpiece engagement. The research for cutter-workpiece engagement (CWE) under different cutting conditions is mainly divided into three types: solid modeling, discrete representation, and analytical methods. The resulting surface quality after machining with a ball end cutter is of great importance because finished milling is often the last process step determining the functional performance of a component.

Keywords

Cutting force, ball-end milling, freeform surfaces, CAD/CAM, cutter-workpiece engagement.

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