TOOLPATH STRATEGY EVALUATION TO MICRO END-MILLING OF CONTACT SURFACES FOR MICROFLUIDIC FLOW

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RESUMO

Microfluidic devices have been extensively used in electronics, chemical and medical industry. These microparts are composed of pockets for fluid distribution along the several channels. In this aspect, bottom surface finishing of the pocket can affect the microfluidic flow, causing variations in pressure between the inlet and outlet of the device, affecting thereby its functionality. Aiming at proposing solutions to such problems, this paper quantifies and discusses the influence of toolpath strategies on the pocket bottom surface finishing of input and output in microfluidic devices. The material used in the tests was a 0.15% carbon steel subjected to thermomechanical process for grain refinement and uniformity of the microstructure, with average grain size of 0.7 µm. The machining strategies applied were offset, helical and raster. Cutting speed and feed per tooth were also considered as variables in the experiments. Images of the machined surface, roughness parameters and analysis of variance were used as analysing tools. When using helical and offset strategies, damages on the machined surface appeared with increasing cutting speed. Feed per tooth did not have statistical influence on the results, and raster strategy showed to be good to produce surfaces without damages at all micromilling conditions.