

Texturing of Tool Insert Using Femtosecond Laser

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Abstract : Chip removal processes are one of key processes of the manufacturing industry where chip removal is conducted by tool inserts of exceptionally hard materials. Tungsten carbide has been extensively used as tool insert for machining processes involving chip removal processes. These hard materials are generally fabricated by single step sintering process as further modification after fabrication in these materials cannot be done easily. Advances in tool surface modification have revealed that advantages such as improved tribological properties and extended tool life can be harnessed from the same tool by texturing the tool rake surface. Moreover, it has been observed that the shape and location of the texture also influences the behavior. Although texturing offers plentiful advantages the challenge lies in the generation of textures on the tool surface. Extremely hard material such as diamond is required to process tungsten carbide. Laser is unique processing tool that does not have a physical contact with the material and thus does not wear. In this research the potential of utilizing laser for texturing of tungsten carbide to develop custom features would be studied. A parametric study of texturing of Tungsten Carbide with a femtosecond laser would be conducted to investigate the process parameters and establish the feasible processing window. The effect of fluence, scan speed and number of repetition would be viewed in detail. Moreover, the mechanism for the generation of features would also be reviewed.

Keywords : laser, texturing, femtosecond, tungsten carbide

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