

Abstract

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Effect of Process Parameters on Abrasive Water Jet Plain Milling

One of the most recent non-conventional shaping processes is the abrasive water jet shaping process. Abrasive water jet shaping has many beneficial parameters such as shaping the various materials hard to soft electrically conductive to insulators, flexibility in shaping, small cutting forces and rapid to shape. The abrasive water jet shaping of materials has various variables and parameters. This work focuses on which of the process variables affect the plain water jet (PWJ) milling process of pockets. In the focusing, machining process variables such as water jet traverse speed, water jet pressure, stand-off distance and abrasive flow rate have been investigated to study the effect of each on the PWJ milling process parameters. The water jet milling process is evaluated by examining the pockets' process parameters namely depth of cut, surface roughness and material removal rate. The material used in the experimental investigation in this work is Aluminum alloy called Alumecc 89. The analysis of the experimental results clears that the increase of the jet traverse speed yields a good surface roughness but inversely decreases the depth of cut. Moreover, it shows that the water jet pressure and the stand-off distance have no effect in the tested range. In addition, the surface roughness, the depth of cut and the material removal rate are widely affected by the abrasive flow rate. The increase of abrasive flow rate yields an increase of the depth of cut and the material removal rate but decreases the surface roughness.