

Abstract

Electrical discharge machining (EDM) is a well-established machining option for manufacturing complex shapes of any conductive materials. EDM has great advantages in machining workpiece with complicated shapes and hard-machining materials. However, it has some disadvantages that the efficiency of EDM is low and this may affect the residual stress and cracking possibility. This study aims to study the effect of the performance evaluation on ultrasonic integrated EDM. An electrode is a copper and a workpiece is mild steel (SS400). The experiments were carried out to compare three processes, Electrical discharge machining (EDM), EDM combined with ultrasonic vibration (EDM/USV) and EDM combined with ultrasonic vibration and addition of SiC particles in to dielectric (EDM/USV/Ab). The results show that EDM/USV/Ab process yields more Material Removal Rate (MRR) than EDM/USV process and EDM process. EDM/USV process also increases the Electrode Wear Ratio (EWR). However, when the EDM/USV process was added by SiC, EWR is decreased. The surface roughness produced by EDM/USV process was smoother than that produced by EDM process. And this can be improved when add SiC in EDM/USV process. White layer's thickness and micro-cracks on a workpiece can be reduced when using USV combined EDM process and yield the least values when using EDM/USV/Ab.