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## Investigation of the machinability of non-conductive ZrO2 with different tool electrodes in EDM (Article)

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### Abstract

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Electrical discharge machining (EDM) is a non-conventional process where complex and difficult-to-cut materials can be machined. Adhesive copper foil as an assisting electrode (AE) is used to cover the zirconia ($ZrO_2$) surface to start the primary spark between the tool electrode and workpiece. Kerosene is dissociated and produces a carbon layer on the workpiece surface when machining of the initial copper foil is completed. Thus machining continues although $ZrO_2$ is a non-conductive material. In this study, the EDM of $ZrO_2$ is investigated with graphite, copper and brass tool electrodes. Material removal rate (MRR) and surface characteristics are analysed. Experiments are performed by varying the parameters peak current and pulse-on time with different tool electrodes. From the experiments, MRR on $ZrO_2$ has been compared for three different tool electrodes. It is found that the graphite tool electrode performs the highest MRR for EDM of $ZrO_2$. The least MRR is obtained by the brass tool electrode. However, better surface quality is observed with the copper tool electrode than EDM with brass or graphite electrodes. This investigation with varying machining parameters and different tool electrodes can be helpful in finding an effective use of the EDM process.

### Author keywords

Assisting electrode Conductive layer Electrical discharge machining Material removal rate Non-conductive ceramics

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