Inverted pressure flushing for drilling EDM

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Abstract

Electrical discharge machining (EDM) is a thermal erosive machining process with low process forces. Commonly, EDM is used to manufacture high precision features in electrically conductive materials with high mechanical hardness and strength. However, the removal mechanism of this process results in debris in the dielectric fluid, which affects the EDM process negatively. An accumulation of this debris is related to process instabilities such as arcs and short circuits, which increase the process time. Therefore, the proper evacuation of the debris is important for a high performance EDM process. The regular pressure flushing is used to evacuate debris alongside the working gap, which causes misdischarges leading to a decreased surface quality and removal rate. The suction flushing is used to evacuate the dielectric fluid and debris through the inside of a hollow electrode, which prevent these lateral discharges. However, only a negative pressure p = -1 bar can be achieved by suction pumps in contrary to a pressure p >> 1 bar by regular pressure flushing. This effect leads to increased process time. The overall goal of this work is to achieve similar flushing power as used in pressure flushing with the advantages of suction flushing by using the inverted pressure flushing.

As a result of this work a new process technology for inverted pressure flushing could be developed. Compared to conventional pressure flushing the process time could be reduced by 10 %.