

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY,
BELGAUM**



A Project Report on

***“Micro machining of brittle materials using mixed electrolyte in
ElectroChemical Discharge Machining”***

Sponsored by K.S.C.S.T., Bangalore.

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Bachelor of Engineering in***

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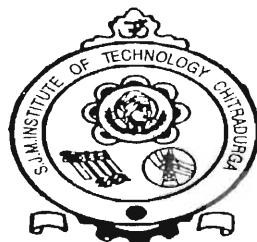
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ABSTRACT

Electrochemical Discharge Machining (ECDM) is a hybrid and modern machining process. It is a potential new technology for machining of brittle and non conductive materials like glass, quartz and ceramics. ECDM is the combination of Electro Chemical Machining and Electrical Discharge Machining process. It consists of cathode tool and anodic electrode dipped in an electrolytic solution and machining takes place by the combined action of spark generation and electrochemical reaction. An experimental setup of ECDM has been developed using advanced electronic devices like micro-controllers to monitor the tool. The electrolytic solution plays a major role in the machining of glass. Many alkaline salt solutions like NaOH, KOH, etc are be used as the electrolyte.

In this project, the combined solution of NaOH and KOH is used as electrolyte. Experiments are conducted using Taguchi Orthogonal Array L9, which helps in reducing the number of experiments. The performance of mixed electrolyte has been studied for different concentration of electrolyte. The effect of process parameters like SOD, Voltage and Concentration of the electrolyte on Material Removal Rate (MRR) for various process parameters are discussed. The optimization of the process parameters is performed using a statistical tool ANOVA. From experimental results, it is observed that the MRR increases with increase in electrolyte concentration. MRR increases with decrease in StandOff Distance (SOD). MRR increase with an increase in voltage up to certain level of voltage. The comparison is made between effect of hallow tool and solid tool on MRR. The over all MRR is more for mixed electrolyte as compared to monolithic electrolyte. The effect of tool size on MRR is also discussed in this project. The developed ECDM setup is used for machining of various shapes on glass.