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MOHAMMAD YEAKUB ALI

AKM NURUL AMIN

**DESIGN FOR MANUFACTURE**

Towards Improved Manufacturability



**IIUM Press**

# DESIGN FOR MANUFACTURE

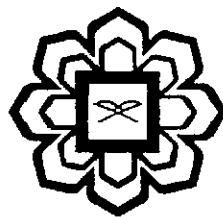
## Towards Improved Manufacturability

### EDITORS

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## Study of the Effect of different Electrodes on Material Removal Rate, Electrode Wear Rate and Surface Roughness in the EDM of S-STAR

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### 1. Introduction

One of the non-conventional machining is Electrical Discharge Machining, EDM, which is subdivided into two primary methods namely ram EDM and wire EDM. The primary difference between the two involves the electrode that is used to perform the machining. Electrical discharge machining is a machining technique using an electrical spark. A controlled electrical spark is used to erode away material that can conduct electricity. A series of electrical discharges takes place between the two conductors separated from each other by a film of non-conducting liquid, called a dielectric. The eroded material again solidifies, in the form of micro sized spheres, in the dielectric and is flushed away by the dielectric.

In one of the methods of EDM, ram EDM, a solid electrode is machined with traditional tools and the specially-shaped electrode is attached to a ram, connected to the power source and slowly fed into the work-piece. The entire machining operation is usually performed while submerged in a fluid bath. In wire EDM (WEDM) process, instead of a solid tool, a wire is used as the cathode. The wire travels through the work-piece in axial direction while the work-piece is fed in specific directions to give it different shapes. The system is computer controlled and it can machine complicated 3D shapes.

The working principle of EDM process is not complicated. The dielectric flows through the gap between the electrodes, which are connected to a pulsed direct current (DC) power supply. This produces sparks between the electrodes, which melt and sometimes vaporize material from both the tool (act as cathode) and the work-piece (act as anode). Figure 1 shows an inter-electrode gap between the tool and the work-piece in which dielectric is flushed at high pressure. Once the power