

ABSTRACT

This study investigates the optimization of Electrical Discharge Machining (EDM) process parameters for Aluminum 7075 Metal Matrix Composite (MMC). Three samples of Aluminum 7075 MMC were prepared using a Stir casting (Aluminum 7075, Aluminium 7075+5% SiC, Aluminium 7075+10%SiC) and subsequently subjected to hardness test, impact tests, SEM and EDAX to characterize their mechanical properties.

The hardness and impact tests revealed the superior mechanical properties of the Aluminum 7075 MMC samples compared to conventional aluminum alloys, highlighting its potential for high-performance applications. Subsequently, EDM experiments were conducted on the samples using varying pulse duration, pulse current, other parameter are constant.

The results of the EDM experiments were analyzed to identify the optimal combination of process parameters that maximize machining efficiency, material removal rate while minimizing tool wear rate and surface roughness. Empirical models were developed to correlate the EDM process parameters with machining performance metrics.

Aluminium 7075 offers high MRR and Minimum SR compare with other two samples. while Aluminium 7075 + 10% SiC shows minimum TWR compare with other two samples. The microstructure and elemental composition of the composites were analyzed using Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Analysis (EDAX).

Keywords: Aluminium 7075 MMC's, TWR, MRR, SR, EDM, SEM,EDAX.