**Paper No: PU-SOE-MECH- 17**

**Surface Integrity Assessment upon Electric Discharge Machining of die steel Using Non-Destructive Magnetic Barkhausen Noise Technique**

Binayaka Nahak, **Ashish Srivastava**, M. Z. Khan Yusufzai Meghanshu Vashista

Department of Mechanical Engineering, Presidency University, Rajanukunte, Yalahanka, Bengaluru-560064, India

**Abstract**

Surface integrity characterization of manufactured component is very important as it significantly affects the in-service performance of the component. Till now, surface integrity was evaluated using conventional measurement technique like microhardness tester, X-ray diffraction, optical microscopy and surface roughness tester. But, this technique being laboratory based cannot be used for in-service monitoring of the surface integrity. The present study focuses on the characterization of surface integrity upon electric discharge machined sample using non-destructive magnetic Barkhausen noise technique. Electric discharge machining was performed in die-sinking mode on die steel using copper–tungsten electrode (negative polarity). Experiment was performed by selecting different levels of peak current, gap voltage and pulse on time. Surface integrity characteristics like microhardness change, residual stress, microstructural alteration and surface roughness were analysed using microhardness tester, X-ray diffraction, optical microscopy and surface roughness tester, respectively, and were then correlated with magnetic parameter like root mean square value and peak value obtained from Barkhausen noise signal. The results show a good correlation between magnetic parameter (RMS and Peak value) of Barkhausen noise with the microhardness and surface roughness of the machined sample.

**Keywords:**

Barkhausen noise, Electric discharge machining, X-ray diffraction, Microhardness, Surface roughness,

**Publication Details:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Journal Name | Vol. | Month & Year | Page No. | Publisher | Scimago Ranking |
| Transactions of Indian institute of metals | 73 | Mar, 2020 | 967-974 | Springer | Q2 |