**Paper No: PU-SOE-MECH- 18**

**Monitoring of thermal damages upon grinding of hardened steel using Barkhausen noise analysis**

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**Abstract**

Thermal damage restrict the capability of grinding in achieving the desired production rate; therefore, the present study focuses on the employment of a non-destructive Barkhausen noise (BN) technique in the assessment of thermal damages produced from grinding of hardened IS 2062 steel under dry (no lubrication) and wet (with lubrication) conditions. Optical microscopy along with microhardness measurement was utilized to reveal the microstructural and hardness alternation occurred in the ground and subsurface of sample. X- ray diffraction peak shift was measured and used for qualitative analysis of residual stress. Furthermore, surface topography was obtained by scanning electron microscope. The magnetic response from ground surface were measured in terms of Barkhausen noise (root mean square) and hysteresis loop (average permeability). The result shows very poor magnetic response from ground hardened steel due to higher carbon content. A non-linear variation is observed between peak shift and root mean square value of Barkhausen noise. However, average permeability derived from hysteresis loop shows good correlation with the peak shift with a correlation coefficient of approximately 0.8149.

**Keywords:**

Surface grinding, Grinding temperature, Microhardness, Residual stress, Surface topography, Magnetic Barkhausen noise

**Publication Details:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Journal Name** | **Vol.** | **Month & Year** | **Page No.** | **Publisher** | **Scimago Ranking** |
| Journal of Mechanical Science and Technology | 34 (5) | Apr, 2020 | 2145-2151 | Springer | Q2 |