Signal Processing of Barkhausen Noise Signal for Assessment of Increasing Down Feed in Surface Ground Components with Poor Micro-Magnetic Response

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Abstract : The Barkhausen Noise Analysis (BNA) technique has been utilized to assess surface integrity of steels. But the BNA technique is not very successful in evaluating surface integrity of ground steels that exhibit poor micro-magnetic response. A new approach has been proposed for the processing of BN signal with Fast Fourier transforms while Wavelet transforms has been used to remove noise from the BN signal, with judicious choice of the 'threshold' value, when the micro-magnetic response of the work material is poor. In the present study, the effect of down feed induced upon conventional plunge surface grinding of hardened bearing steel has been investigated along with an ultrasonically cleaned, wet polished and a sample ground with spark out technique for benchmarking. Moreover, the FFT analysis has been established, at different sets of applied voltages and applied frequency and the pattern of the BN signal in the frequency domain is analyzed. The study also depicts the wavelet transforms technique with different levels of decomposition and different mother wavelets, which has been used to reduce the noise value in BN signal of materials with poor micro-magnetic response, in order to standardize the procedure for all BN signals depending on the frequency of the applied voltage.