

PWI and Pulse compression applied to determining hardening depth in wind turbine bearings

Héctor Calás¹, Amaia Alberdi², Jean-Philippe GAUDIAU³, Cyril Thibault⁴

¹Applications, AOS/TPAC, France, ¹NDT, RENOGEAR, Spain, ¹SW, AOS/TPAC, France, ¹BDM, AOS/TPAC, France

A critical point in the manufacture of wind turbine bearings is ensuring surface hardening while their cores remain in the original structural condition. Surface hardness and case-depth measurements are the most important parameters for quality monitoring of surface-hardened steel products. One of the techniques commonly used to measure the depth of hardening is ultrasonic backscatter. When the hardening process generates a large transition zone, identifying the depth of the hardness zone can be complicated, because the back scattering response can be confused with the transition zone. Accurately determining this depth can be the difference between a piece passing regulations or not. In this work, we present the application of PWI to create the imaging of the backscattering pattern in the transition zone. With this approach, a B-Scan view can be evaluated point by point in contrast to the classic analysis based on the A-scan. In addition to obtaining a reduction in the influence of the transition zone over the measurement, we have proposed a pulse compression method based on the arbitrary wave generation (AWG) capabilities of the Pioneer device. A specific focused phased array transducer was designed for the application of this technique. The results obtained in mock-ups and real pieces are presented in comparison with conventional results.