Automatic Determination of the Sensitivity in Automated Ultrasonic Testing Using the Example of Rotationally Symmetric Components

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In all non-destructive evaluation methods, the sensitivity is a core parameter with regard to the inspection evaluation and component quality. It must be assumed by calculation engineers that material inhomogeneities which cause a signal below the sensitivity cannot be found and for material scientists and inspectors that the sensitivity is an indicator for the quality and testability of the material. In ultrasonic testing, the sensitivity is usually determined by measuring the noise level in relation to reference reflectors or using the DGS method. In order to ensure a sufficient signal-to-noise ratio, an allowance of 6 dB is usually used. In automated tests, this is partially reduced to 3 dB. However, the noise level is usually determined manually, even in automated testing, and a comparison of the sensitivity determined by different inspectors on the basis of automatically recorded ultrasonic data showed a variance of about ±15%. This is largely caused by a very different interpretation of the noise level. In order to improve the significance of the parameter sensitivity, this publication proposes a procedure for the automatic determination of the sensitivity using the example of rotationally symmetric components. The algorithm statistically evaluates the results of automated tests. It uses the symmetry of the component and provides a local sensitivity distribution dependent on radius and thickness as well as the global sensitivity. The evaluation is performed automatically without input from the inspector, regardless of whether the component shows indications or not. In addition to conventional automated ultrasonic testing, the algorithm can also be used for the results of Q-SAFT inspections.