Weld Bonding Quality Control Based Local Excitation Using Piezoelectric Material

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Welding is a technology widely used in various industries such as transportation, precision equipment, home appliances, such as automobiles and ships. As the range of use increases and the details of welding are diversified, stability problems due to welding defects are emerging. Hidden defects inside the welds are not easy to find and due to their nature, defects are evaluated in the form of non-destructive inspection. Conventional ultrasonic flaw detection, which is judged by welding size or cross-sectional state, has a disadvantage in that it takes much time and costs for flaw detection for all welding sections. In this study, the development of the welding defect derivation evaluation method using the vibration characteristics in accordance with the change of the bonding force and the welding degree was developed using the ultrasonic vibration. The Piezoelectric element was used to localize the welded part and the coupling stiffness was derived from the resonance frequency of the transfer function calculated from various sensors. As the pore size and quantity increased, the bond stiffness decreased and as the wire moisture absorption rate increased, the bond stiffness tended to increase. Through the study, it is possible to present objective quantitative values in the evaluation methods limited to the existing qualitative and subjective judgments in the determination of bond stiffness.