

Non-contact Ultrasonic Thickness Measurement Methods for Inspecting Marine Infrastructure.

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As an archipelago nation, Japan has had to make significant investments in its marine infrastructure in order to utilize its surrounding shoreline. The steel sheets and pipes making up the piles that support these offshore structures are subject to corrosion due to their constant contact with seawater as they are buffeted by waves. Ultrasonic measurements are capable of determining the remaining thicknesses of these materials when seeking the annual loss or rate at which the steel is being corroded. To take these measurements, the material must first be cleaned to remove accumulated deposits, using a grinder to prepare the surface, as current methods require the ultrasonic probe to be in direct contact with the location being measured. This increases the workload as the ground surface must be healed using epoxy resin once the measurement has been completed. This study considers non-contact ultrasonic thickness measurement methods that do not require cleaning or surface preparation with a grinder. Three areas were considered: 1) ultrasonic echoes with and without surface deposits, 2) basic measurement techniques, and 3) how to apply the method to ultrasonic thickness gauges. The results from this study on the concepts behind thickness measurements on unprepared surfaces will serve as a base for future field work.