

# **Development of PAUT Performance Demonstration(PD) System for Improving The Reliability of Thermal Power Plant Facilities in Korea**

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Recently, there has been a trend towards expanding the use of NDT performance demonstration systems in various fields to improve the reliability of NDT results on a global scale, particularly in nuclear power plants. In this study, we developed a phased array ultrasonic testing performance demonstration system (PAUT PD System) for boiler tube/pipe welds, which are major components of Korean thermal power plants. Inspectors measured the size, location, and type of defects using the developed system and wrote reports through a Round Robin Test (RRT). The specimens were fabricated with identical materials, specifications and welding procedure to those used in the thermal power plant. In order to compare the detectability of the types of defects, it was designed including planar defects(IP, LF, crack) and volume defects(porosity, slag). Through reliability analysis of POD (Probability of Detection) and sizing based on RRT data, we analyzed the skill differences among different inspectors and the key factors associated with these differences. We aimed to examine ways to optimize the PD system, improve the skills of inspectors, and produce accurate and reliable inspection results. All inspectors were able to detect most defects, and there was little difference in the inspection results between each inspector. These results performance demonstration(PD) is possible through RRT. As a result, adoption of the PD method for non-destructive inspection of thermal power plants will increase the reliability of inspection results The Korea Institute of Energy Technology Evaluation and Planning (KETEP), and the Ministry of Trade, Industry, and Energy (MOTIE) of Korea (Grant No. 20217410100100) supported this work.