

NE-26-37862 High-Temperature Pipe Wall-Thickness Detection System

Nuclear AI, LLC, located in Bluffton, South Carolina, accelerates the safe deployment of advanced nuclear reactors by developing enabling technologies that solve critical materials and operational challenges. Its vision is to commercialize tools that extend component lifetimes, reduce maintenance costs, and enhance safety.

Nuclear AI is developing a high-temperature ultrasonic lead zirconate titanate (PZT) wall-thickness detection system capable of operating at pipe surface temperatures up to 700°C (with potential applications up to 900°C), extending the current limit of 550°C. While the use of waveguides with PZT detectors and various couplants is established, Nuclear AI intends to develop systems for performance with couplants at 700°C to 900°C to perform inspections and confirm structural integrity to reduce risk for advanced reactor piping and vessel components.

Nuclear AI will partner with Pacific Northwest National Laboratory (PNNL) to utilize the capabilities for the Nondestructive Evaluation Unit of the Engineering Materials group. PNNL will use high-temperature furnace infrastructure, ultrasonic PZT sensor components, and high precision prototyping equipment to demonstrate the efficacy of a high temperature pipe wall thickness detector. The ability to perform inspections and vet structural integrity at these temperatures would support advanced reactor inspection programs for piping and vessel components.