

N293. Combining AI and NDE to Aid Pipework Repair and Inspection Decision

Computer tomography, ultrasonic holography, and electromagnetic acoustic transducer technology (NDE) have been combined with software using AI principles to create a system that focuses inspection work on the parts of plant pipework most vulnerable to cracking. Ultimately, the system could enable staff without specialist knowledge to take decision about repairs.

First, a database was used to predict the locations where defects are likely to occur. In parallel with the database, a defect identification program which identifies the defect by matching with the database was developed to identify the types of defect that occurred and to evaluate quickly and automatically the degree of their potential harmfulness to safety if the plant were to continue operation. To achieve these aims, it was decided to use the development tools of an expert system using an artificial intelligence (AI) language for the main defect identification program.

If a defect is detected, or if the program for evaluating crack initiation probability indicates the likely occurrence of a defect, a sectional image of the area concerned could be inspected by using the specially developed X-ray computer tomography (CT) scanner.

Digital ultrasonic holographic equipment was developed to obtain data for the defect identification program. It provides information about the shape, dimensions and inclination of the defect from the three-dimensional image of a defect detected by in-service inspection.

The electromagnetic acoustic transducer serves a similar purpose to the ultrasonic holographic unit.

Taken from, "Combining AI and NDE to Aid Pipework Repair," Nuclear Engineering International, p. 31, July 1993.