

EVALUATING THE VARIABLES THAT IMPACT ULTRASONIC TESTING

Daniel Wayne Looten

Dr. Glenn Washer, Thesis Supervisor

ABSTRACT

The goal of this research was to improve the quality control process for steel fabrication to improve the reliability, safety and quality of welded steel components. The objectives of this project were to explore the relationship between the capabilities of ultrasonic testing (UT) and phased array ultrasonic testing (PAUT) and the requirements for flaw detection and characterization. This research assessed the variables that impact UT measurements to improve the methodology used to inspect steel welds in structural components.

This research explored the variables that influence the ultrasonic response to improve which include: length measurement, beam spread, attenuation, defect orientation, transducer rotation, wedge angle and defect sizing. The results from these tests were then compared to the American Welding Society (AWS) UT procedure used to inspect structural components in steel bridges. The findings from the length measurement test indicated that defects smaller than the transducer were typically oversized. The results from the defect orientation and wedge angle tests indicated that the defect's orientation and the wedge angle greatly affected the reflected amplitude. The results from the attenuation tests indicated that the assumptions made in AWS acceptance criteria were inaccurate.