

NCHRP 20-68 – “US Domestic Scan Program”
Domestic Scan 23-03 Advances in Evaluation of Weld Quality

The technologies for weld inspection and advances made in weld quality for ship building and heavy equipment industries have advanced significantly over time. The quality of welds is maintained by process control and inspection during the welding operation. Welding parameter data is acquired continuously by the welding equipment used, and parameters adjusted as the weld is made, providing greater control and associated uniformity. Information gathered during the welding process is recorded to provide a record of the weld quality. Post-weld inspection is then adapted based on this information. These industries use automated inspection techniques to perform the quality verification (QV) of welds. The owner's inspector evaluates the digital output provided much in the same way that bridge inspectors use radiographic and ultrasonic evaluation data to assure weld quality. The current state of the practice of the control of weld quality for highway bridges and structures relies on qualification of weld procedures and visual inspection of the completed weld. The inspection procedures are manual inspections requiring considerable time and effort which greatly add to the fabrication time. Potentially using more advanced approaches used by other industries by bridge owners in the fabrication of steel bridges could potentially increase weld quality, eliminate the time and cost required for post weld inspection, and provide a digital record of the weld geometry.

The objective of the scan is to examine the state of the art of in-process weld inspection and the resulting quality assurance used for ship building and heavy equipment manufacturing. The scan team will investigate the processes and controls used to produce quality welds in other than highway industries. The scan team will examine the equipment involved in weld inspection and quality assurance, the specifications used for equipment requirements and quality control procedures and calibration of the equipment to the appropriate quality standards. The team's study will include reviewing the state of the art of the in-process inspection including items such as monitoring welding variable, measurement of weld size using laser scanning and the resulting reliability of the weld quality using in process inspection. As part of its examinations the scan team will also examine current state of practice within the AASHTO bridge community for comparative purposes. Agencies that may be of interest to study include Caterpillar of Peoria IL; Bath Iron Works of Bath, ME; Ingalls of Pascagoula, MS; Vigor of Portland OR and U.S. Navy fabrication facilities.

This scan is being planned as a Traveling Scan (Type 1). The scan will entail compilation of effective practices and lessons learned by contributing agencies that potentially can be transferred to practice by the highway bridge community and result in increase safety and reliability of welded bridge at reduced costs. Further the generation of digital inspection records might provide a source of information for use in future in-service inspections. The resulting findings could be considered by the AASHTO Committee on Bridges and Structures (COBS) and two of its technical committees, T-14 AASHTO Technical Committee for Structural Steel Design and T-17 AASHTO Technical Committee for Metal Fabrication and may lead to revisions to codes and practices they maintain.

Original Scan Proposal Title: 23-06 Real Time Evaluation of Weld Quality