Welds

Welds play a crucial role in product safety, quality, reliability, strength, and durability in many industries. From the manufacture of automobiles, planes, and ships, to the construction of highways, bridges, buildings, pressure vessels, and pipelines, the effective application of welds is a key ingredient to a successful end product. Various standards institutions (ASTM, JIS, ISO, EN, SAA, and WES) around the globe have put in place standards that provide consistency in test procedures for welds.

Welds are tested in both a dynamic and static state. Common tests on welds are tension, bend/ flex, shear, hardness, impact, and fatigue.

Hardness

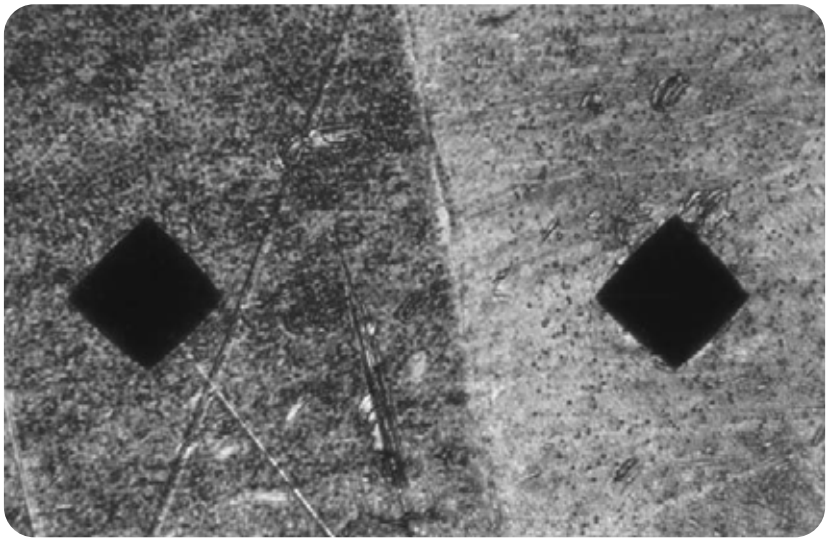
The Challenge

Hardness testing of welded material is an excellent example of the traditional challenges associated with micro hardness testing. A series of traversed hardness measurements across the weld, and most importantly in the Heat-Affected Zone (HAZ), can determine if the weld is applied correctly and within specifications.

Traditional testing techniques require manual stage traversing and manual indentation reading via a microscope system. The results obtained in this manner are subjective and dependent on each individual's interpretation; therefore the accuracy, consistency, and reliability of the test data are questionable. Other disadvantages to this approach are the associated costs, extensive labor requirements, and fatigue factor resulting from repetitive microscope work. Adding to the difficulties in weld analysis is the stark contrast between the HAZ and the surrounding areas. For years this minimized or negated the effectiveness of automatic indention reading packages, requiring time-consuming manual test procedures.

Our Solution

Recent advances in digital camera technology, application software, and testing hardware have played a significant role in the emergence of image analysis as a viable tool in weld assessment. Intron• incorporates these advances in a complete hands-off automated indentation and analysis system based on the Wilson• Instruments Tukon™ 2100B micro hardness tester. Through use of a precision XY indexing stage, automation of the micro hardness tester, high-resolution Sony• digital camera, and a powerful software package, the results produced by the Tukon 2100B are guaranteed to be accurate, reliable, and consistent. The efficiency of this approach also results in higher throughput.



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Cross-section of welded tubing in the HAZ using a 500 g Vickers indent and automatic traverse system. The image is analyzed at 200X magnification utilizing automatic image analysis software.