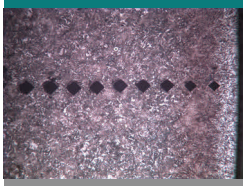
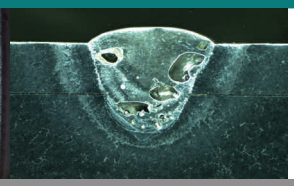
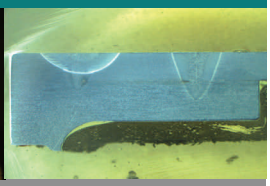


New Hampshire MATERIALS LABORATORY, INC.
Your Problem Solving Partner



Weld Exams

6/25/2009 by Tim Kenney, Laboratory Director

Case history from Materials Department of NHML

Customer Problem: During a routine inspection of a heated pressure vessel transverse cracks were noted in a horizontal weld. A coupon was removed for examination of the weld cracks.

What NHML did to solve problem: The vessel was constructed of 1/4″ type 316 stainless steel plate. Visual examination of the coupon revealed no obvious defects other than two transverse weld cracks. Metallographic coupons were prepared for examination of the weld, heat affected zone, and base metal. Microscopic examination of these coupons revealed extensive branching, transgranular fractures typical of chloride induced stress corrosion cracking. Energy dispersive spectroscopy detected approximately 7% chlorine on the fracture surfaces confirming the failure mechanism. The visible transverse weld cracks were found to be part of an extensive network of stress corrosion cracking, severely compromising the integrity pressure vessel.

Benefit to customer: The visible transverse weld cracks were found to be part of an extensive network of stress corrosion cracking, severely compromising the integrity pressure vessel. The customer has the option of selecting a different alloy for the application or scheduling regular replacement of the vessel to avoid unscheduled catastrophic failure.

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