Abstract Title: Pulse-echo Ultrasonic Inspection of Small Bore Nozzle welds.

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Abstract:

Small bore nozzle welds in pressure vessel shells are generally inspected at manufacture by ultrasonic inspection from the vessel shell surface only due to the impracticality of scanning from the restricted access of the bore itself. A relatively simple bore scanner could be developed to facilitate bore scanning without incurring outlay for a fully automated inspection. This approach could improve the situation for relatively little outlay. However, this does not support inspection during service where internal access may not be available.

The problem associated with not having access to the nozzle bore lies with oblique angles of scanning incidence at the vertical fusion face. Experience has shown that large, smooth, planar flaws can go unreported when applying the acceptance criteria of major construction codes and standards. These acceptance criteria are based on the assumption of access from both sides of a weld, and in the case of small bore nozzles the access limitation presents a significant constraint. Flaws located on the vertical fusion face that are not detected and repaired at the point of manufacture can break out during service and cause major shutdown delays. This is especially the case if flaws are detected in successive weld passes.

The paper deals with simple scanning devices to facilitate scanning from the bore where internal access is available and also external scanning where internal access is not available. Modified acceptance criteria are also provided for vertical weld fusion faces for situations where internal access for normal beam incidence is not available.