

Inspection of defects in the R-Zone of Q420 large-section and high strength angle steel by ultrasonic phased array

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Large-section and high strength angle steel has the characteristics of strong bearing capacity, clear force transmission, convenient processing and good integrity, and has been widely used in the construction of power transmission towers in recent years. However, due to the influence of manufacturing technology, the defects such as pores and cracks are easy to appear in the R-zone of angle steel, which seriously affect the strength and bearing capacity of the component. In this paper, the feasibility and effectiveness of ultrasonic phased array technology for R-zone defect inspection of angle steel are researched. Firstly, the three-dimensional simulation of ultrasonic phased array inspection of angle steel is carried out. For two testing positions, inside and outside of the straight edge, the propagation characteristics of ultrasonic waves in the R-zone of angle steel and the response characteristics of defects to echoes are analyzed. Secondly, angle steel specimens containing simulation defects (cracks and porosity) are prepared. Finally, the ultrasonic phased array testing of the specimens is carried out, and all the simulated defects in the R-zone are inspected successfully. The results show that the ultrasonic phased array technology can be used for in-situ inspection of the internal defects of angle steel efficiently and accurately during both the manufacturing stage and after the tower construction.