

Phased array ultrasonic testing for friction welding of hydraulic cylinder piston rods

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Hydraulic cylinders operate on the principle of moving a piston while applying a certain pressure using hydraulic oil. In general, hydraulic cylinders have a piston located inside a cylinder filled with hydraulic oil, and operate using the difference in fluid pressure between the inside and outside of the cylinder. Hydraulic cylinders have the size of the force applied to the piston determined by the pressure of the fluid, and are manufactured in various sizes and shapes. Due to these characteristics, hydraulic cylinders are widely used in industrial fields, especially in automation systems, control systems, and construction machinery. However, because hydraulic cylinders generate very high pressure, the reliability and safety of related parts are very important issues. In particular, the piston rod, which is one of the most important hydraulic cylinder parts, often uses a knuckle at the tip, and in this case, friction welding is often used to connect the rod and the knuckle. In this paper, we introduce phased array ultrasonic testing to detect defects in rod/knuckle cross sections. And we present results from reference test blocks including products with defects that occurred during actual production to verify the reliability of the applied technique. This technology is optimized for specific production processes and has also expandability to technology for condition monitoring of products in similar processes.