



Solid Axle Inspection with Phased Array Ultrasonic Cone Probe

Ultrasonic Application Solutions

Application

Solid train axles must be inspected in order to detect possible flaws. In production, axles are loose and the manufactures are looking for volumetric flaws resulting from inclusions, gas holes, and transversal notches induced by thermal treatments and machining. In service inspection, the axle can be scanned from the lateral surfaces with angle beam probe but this could imply to remove wheels, gears, brakes, etc.

Solution

In order to detect flaws, this cone probe (figure 1) is operating in phased array technique with shear waves to inspect the axle set from the center hole at the face of the axle (s. figure 2). The complete circumference of the axle is tested by a rotation of the probe over 360°. The benefit of phased array is the capability of varying the angle of the beam, improving so the probability of detection with a reduced inspection time. Also, with one single probe it is possible to check in one round all the sections of interest by using different beam angles.



Figure 1: Rail train & phased array cone probe

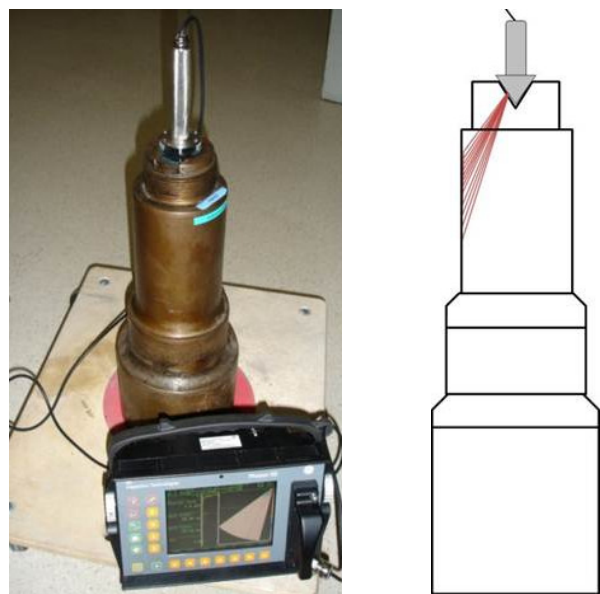


Figure 2: Test axle block & measurement concept

Ultrasonic Cone Probes PA-ASW 2/90 and PA-ASW 4/90

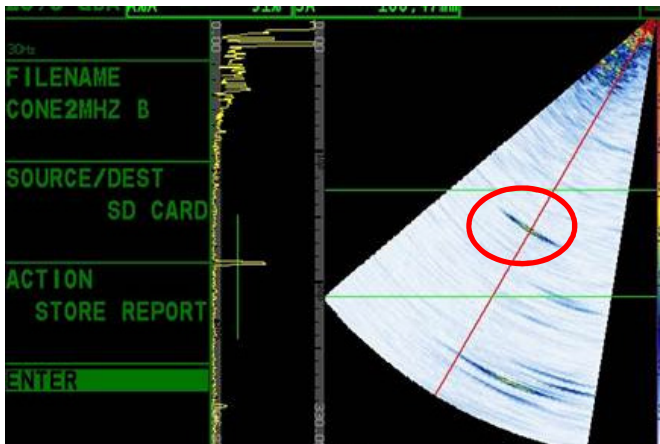


Figure 3: Flaw at 150mm depth with 31°

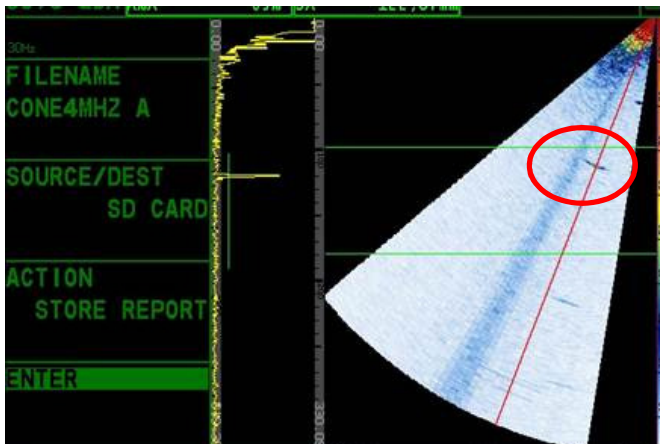


Figure 4: Flaw at 80mm depth with 22°

General solution information

Probes

- 2MHz probe: PA-ASW 2/90 [69246]
- 4MHz probe: PA-ASW 2/90 [69186]

Instrument

- Phasor XS

Part numbers			
PA-ASW (2MHz)	0069246	PA-ASW (4MHz)	0069186
Phasor XS	0014372		



GE imagination at work

The test axle block in figure 2 includes two distinct circumferential notches (located in 80mm and 150 depth from the face), both of them with same dimensions. Figures 3 and 4 show the detected notches (red circle) recorded with the 4MHz version of the probe.

The phased array cone probe (see figure 1) is available in 2MHz and 4 MHz. It includes 16 elements with a pitch of 0,875mm and an elevation of 14mm. The cone has an angle of 90° (according to the customer, a 60° cone can also be delivered).

Your benefit

- Save money by eliminating destructive testing and by improving your process
- Improvement of the probability of detection with phased array
- Save time by using one probe for different refracted angles

Contact the GE European Solutions Center for your individual inspection problems:

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