Ultrasonic Inspection of Forgings and Castings Using the Wave BEA Correction tools

Application Note

Introduction

Forging is the process of shaping metals using hammering, closed and open die pressing etc. in both hot and cold states. Forged parts come in a wide variety of shapes and sizes and can be found in industrial processes worldwide. They can be simple threaded bolts or safety-critical parts, such as crane hooks responsible for the safe lifting of heavy loads. Inspections of these parts are carried out before maintenance to ensure compliance with the required standard and during the service life of the part. In this Application Note, the focus is on single-crystal inspections using a Sonatest Wave.

Figure 1 – Casting metals before forging into

These steel parts are typically designed to meet higher strength specifications, ensuring that the material properties align with superior mechanical design. Ultrasound testing (UT) plays a particularly crucial role in the quality control process for these manufactured parts ensuring material quality and dimensional accuracy.

UT Method

The Sonatest Wave offers various tools for efficient quality control of forged parts. First, the UT inspection procedure may involve a specialized probe and reference calibration with a high level of repeatability in defect detection. Second, the instrument should effectively display clear measurements based on the A-scan.

Industries

- Aerospace Aeronautical Inspection
- Aerospace Astronautical Inspection
- Chemical & Petrochemical Sector
- Oil & Gas Sector
- Nuclear Energy Sector
- Rail Sector
- Maritime Shipping Industries
- Automotive Industry
- Mining Sector
- Construction and Infrastructure

Application

- Casting/Forging Inspection
- Asset Integrity
- Flaw Detection and Evaluation

Typical Parts

- Pinions, Gears and Force Shafts
- High Strength Components
- Train Axels
- Forged Part in General

Inspection Techniques

- Manual UT

Features and Benefits

- Wide bandwidth instrument for low frequency probe range
- Narrow filters for low damping probes providing a better sensitivity.
- Live Ray Tracing and A-Scan on our exclusive interactive scan plan for simple or complex parts inspections.
- Import specific DXF drawings to identify geometry echoes and apply BEA if needed.

The Wave 2.0 update adds Back-wall Echo Attenuation (BEA) tuning to the feature list. Enhancing A-scan visualisation, BEA improves the visibility of the back-wall echo by reducing the signal height (which is often >100% full screen height (FSH)) to within the 100% FSH range of the screen. It does this without changing or affecting the sensitivity settings of the A-Scan range before the backwall echo, this means any sizing calibrations set for the item volume are unaffected by the BEA activation. This allows the inspecting technician to scan the volume of the part and monitor the back wall for amplitude changes in the same scan. Without this feature, the part must be scanned twice.

Figure 2 – Video showing Efficient Back-wall Monitoring with BEA (**click here to see a video**)

Conclusion

Sonatest provides a complete UT instrument package, which includes high-quality probes, calibration blocks, and modern software tailored to your inspection needs.

CTA: For further information or support, please contact the Sonatest Applications Team: applications@sonatest.com

Recommended Tool Package

Category	Part #	Description
Acquisition Unit	Wave BNC or Wave LEMO	Ultrasonic Flaw Detector with a live interactive scan plan and .dxf CAD import for complex parts.
Probe	SLF (2.25 and 5 MHz) SHM (2 and 4 MHz) PSLF (0.5 to 5 MHz) (connectors and cables to choose)	Check out the probe catalogue for more information.
Calibration Block	DAC, IIW, K1 or V1 blocks	We reserved a dedicated page for calibration blocks.

Get in touch with your local Sonatest expert, available in more than 50 countries over 5 continents!

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