



## Application Note

# Ultrasonic Testing of Iron, Steel, Aluminum, and Non-Ferrous Castings

This general category of cast metals includes many applications suitable for ultrasonic thickness gauging. Cast metal parts come in a wide range of geometries and compositions.

Because most castings scatter ultrasound rapidly, the maximum thickness that can be measured is often limited. In general, 4 in. (100 mm) is about the upper limit, although in some cases it is possible to measure up to 10 in. (250 mm). Poor surface conditions, large grain size, and sound velocity variations usually account for calibrated accuracies of  $\pm 0.002$  to  $\pm 0.005$  in. ( $\pm 0.05$  to  $\pm 0.125$  mm). Thin aluminum castings can be measured with a calibrated accuracy of  $\pm 0.001$  in. ( $\pm 0.02$  mm), but thick cast stainless steel is usually limited to an accuracy of  $\pm 0.010$  in. ( $\pm 0.25$  mm) or less.

## Ultrasonic Testing Equipment Used for Cast Metals

Three Olympus precision gauge models are commonly recommended for cast metal thickness measurement: the 38DL PLUS™ gauge with High Penetration software, the 45MG gauge with Single Element High Penetration software, and the 72DL PLUS™ gauge. Transducer selection and gauge setup depend on the material and thickness range being tested. Common choices include the M1036 (2.25 MHz) and M109/M110 (5 MHz) transducers. Lower frequency transducers such as the 0.5 MHz M101 are recommended for very thick or coarse-grained castings.

For the detection of subsurface porosity, cracks, or inclusions in cast metals, we also offer a complete line of digital ultrasonic flaw detectors.

To learn more about cast metal inspections, see our application note on [Ultrasonic Testing in the Foundry Industry](https://www.olympus-ims.com/en/applications/ultrasonic-testing-foundry-industry/) (<https://www.olympus-ims.com/en/applications/ultrasonic-testing-foundry-industry/>).

## Products used for this application



### 38DL PLUS

The 38DL PLUS advanced ultrasonic thickness gauge uses dual element transducers for internal corrosion applications and has features that include THRU-COAT technology and echo-to-echo. It uses single element transducers for very precise thickness measurements of thin, very thick, or multilayer materials.



### 45MG

The handheld 45MG ultrasonic thickness gauge is packed with measurement features and software options. This unique instrument is compatible with the complete range of Olympus dual element and single element transducers, making this gauge an all-in-one solution for virtually every thickness gauge application.



### 72DL PLUS

The 72DL PLUS advanced precision ultrasonic thickness gauge uses a single element transducer up to 125 MHz. It features a large high-resolution touch screen display and is ideally suited to measure the thickness of very thin materials, including multilayer paint, coatings, and plastic. It can simultaneously display the thickness of up to 6 layers.

[www.olympus-ims.com](http://www.olympus-ims.com)

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