

How to measure thin materials accurately using the Elcometer PTG8 Ultrasonic Thickness Gauge

When it comes to measuring the thickness of small, thin, or intricate components, how do you quickly and non-destructively measure the thickness of the material, when you don't have access to both sides? Typically, using an ultrasonic precision thickness gauge.

When you need to measure thin materials with pinpoint accuracy, the Elcometer PTG6 and PTG8 Ultrasonic Precision Thickness Gauges are designed to measure on virtually any uncoated thin material.

Unlike other ultrasonic thickness gauges, which can be notoriously difficult to operate, with confusing and unclear menus - the Elcometer PTG range's easy-to-use menu system, in multiple languages, mean they can be used straight out-of-the-box, with little or no training required; whilst still delivering highly accurate material thickness measurements.

Taking a reading on very thin substrates, when accuracy is critical, couldn't be easier - using a very small amount of ultrasonic couplant, press the transducer flat against the surface.

When the transducer is placed on the material, the reading stability indicator shows how strong the ultrasonic signal is – a red or orange bar means you may need to adjust how you're holding the transducer, or where on the material you are placing it; while a full bar means a strong signal, ensuring accurate, reliable measurements.

The Elcometer PTG range uses single element transducers to provide precise, accurate material thickness measurements to one hundredth of a millimetre - or one thousandth of an inch - of thin uncoated materials; such as steel, titanium and plastic; from as little as 0.15mm thick.

So, how does it work?

Single element transducers consist of a crystal, which emits an ultrasound pulse when triggered by a voltage. This energy pulse travels from the transducer and into the material, aided by ultrasonic couplant, hits the back-wall of the material, and echoes back towards the crystal where it is detected. The gauge then uses the speed of the pulse, and the time taken between the pulse being emitted and the echo being detected, to calculate the thickness of the material.

However, measuring thin materials means that the ultrasonic signal will return to the transducer incredibly quickly, and as a result there is not always enough time between the pulse leaving the element, and the echo returning. This is why, when using an Elcometer PTG, single element transducers use a delay line, to increase the time between the pulse being sent and the echo being received, ensuring more accurate results.

The material you are measuring will affect the material of the delay line you should use. For example, acrylic delay lines are suitable for measuring on steel, aluminium, and titanium; while thin plastics and other similar materials should be measured using a graphite delay line, with the gauge set to Plastic Mode.

You simply input the length and material of the delay line before starting, and the gauge will subtract it from future measurements, leaving just the thickness of the material.

Whenever you change delay lines, you should ensure there is a small amount of ultrasonic couplant between the delay line and the transducer, making sure there is no free air between them; and always remember to change the delay line setting within the gauge.

When measuring on materials that deflect or absorb the ultrasonic signal, the Elcometer PTG gauges only allow you to save a measurement if the signal strength indicator is in the green - avoiding false or incorrect readings.

The Elcometer PTG thickness gauges are designed to work with Elcometer's range of intelligent transducers, which all have automatic probe recognition - so as soon as the transducer is connected to a gauge, it immediately detects what type of transducer you're working with. All you need to do is set the appropriate length and material of delay line.

If you already have a range of transducers you wish to use which have Lemo Connectors; they can be connected to the Elcometer PTGs using a single element transducer adaptor – you simply tell the gauge what transducer you are using, as well as the delay line.

The Elcometer PTG range have user selectable measurement rates of up to 16 readings-per-second (16 Hertz); ideal for quickly scrubbing across a surface, recording multiple measurements.

Alternatively, the top-of-the-range Elcometer PTG8 has scan mode for checking large surface areas. Simply scrub the transducer over the test area, and the gauge will display the average, lowest, and highest thicknesses across the scanned area.

In addition to displaying the material thickness, the Elcometer PTG8 has a choice of displays which include user selectable statistics, thickness bar graphs, and run charts.

The Elcometer PTG8 is also equipped with B-Scan mode; which shows any changes in the material thickness, visually, as you move across the surface - ideal for quickly identifying large changes in depth within the material.

Alternatively, differential mode displays the last reading, and how much it differs from the user definable nominal value – also known as the target thickness – indicating where the material is thinner or thicker than expected.

With Limit Memories, the Elcometer PTG8 allows you to set high and low limits, as well as the previously mentioned nominal target thickness. Once defined, whenever a reading exceeds these limits, the gauge gives you an audio and visual warning, clearly highlighting any problem areas.

In order to easily maintain the gauges' 1% accuracy, the Elcometer PTG6 and PTG8 have a range of calibration options, with simple, on-screen instructions that guide you through each method step-by-step. To find out more about all of the calibration methods, make sure you watch our Ultrasonic NDT calibration videos.

Storing up to 100,000 readings, in up to 1,000 sequential or grid batches, along with statistics, limits, and calibration information; the Elcometer PTG8 can transfer all this via USB or Bluetooth, to ElcoMaster, our free application for PC, or your own inspection app. Alternatively, use Bluetooth to connect your Android or Apple mobile device, and use the ElcoMaster App to generate professional inspection reports instantly, wherever you are.

For more information on Elcometer's full range of NDT inspection gauges, simply visit Elcometer.com, or click on one of the links on-screen.

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