Coating Thickness Gages

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Why Measure Coating Thickness?

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Arguably the single most important measurement made during application and inspection of protective coatings

Affects the appearance and performance of the coating system:

- Color
- Gloss
- Surface profile
- Adhesion
- Flexibility
- Impact resistance
- Hardness

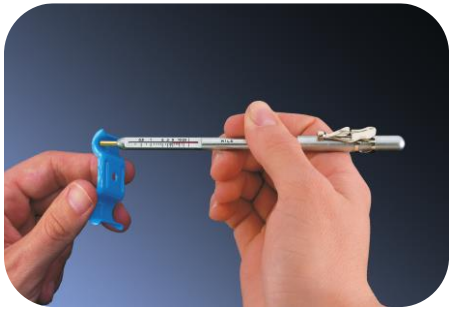
Helps control material costs, manage application efficiency, maintain finish quality and ensure compliance with contract specifications

Principles of Operation

DeFelsko uses three principles of operation to measure dry film thickness on different substrates:

- **Magnetic:** Ferrous (magnetic) metal substrates (steel, iron)
- **Eddy Current:** Non-ferrous metals substrates (aluminum, titanium)
- **Ultrasonic:** Non-metals (plastic, wood, concrete)

Coating Thickness Solutions from DeFelsko



PosiPen

PosiTest F

PosiTest DFT

PosiTector 6000

PosiTector 200

Mechanical Coating Thickness Gauges - PosiTest® & PosiPen®

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- Magnetic ‘Pull off’ type gages for ferrous metals
- Measure the force required to pull a magnet away from the coating
  - ✓ It is easier to pull the magnet away from thick coatings, as magnetic attraction decreases with distance

Selling points

- No electronics or batteries - ideal for flammable environments or underwater use
- Inexpensive, rugged, and portable - ideal for situations where quality goals require only a few readings
- Do not require any calibration adjustment
- Rugged and simple to operate

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PosiPen®

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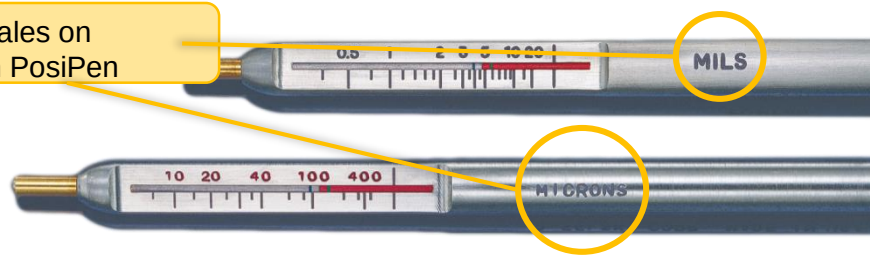
Selling points

- Ideal for small, hot or hard-to-reach surfaces
- ± 10% accuracy
- Best option to measure extremely small parts and challenging geometries
- Ideal for spot checks - fits in a shirt pocket
- Metric and Imperial scales on opposing sides

2 Scales on each PosiPen



How to use

1. Place the tip of the PosiPen against the coating
2. Slowly pull the PosiPen away from the coating, in a single consistent motion
3. Record the furthest distance the indicator traveled at pull-off, according to the Triple Indicator

PosiPen® Triple Indicator : Compensates for Gravity

PosiTest®

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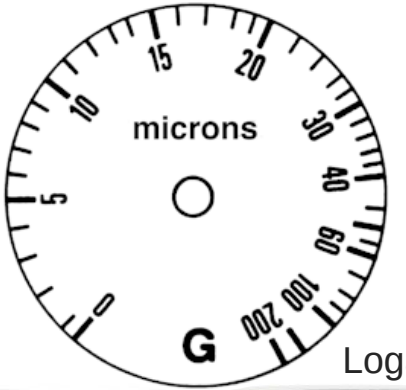
Two models		
Model	Scale	Common Applications
PosiTest F PosiTest FM	0 - 2000 µm 0 – 80 mils	Hot dip galvanizing, hard chrome metalizing, paint, enamel, plastic coatings on steel
PosiTest G PosiTest GM	0 - 200 µm 0 – 8 mils	Electroplating, thin paint films, phosphating on steel



Logarithmic scales

Selling points

- Simple
- ± 5% accuracy
- Go / No-go button
- No electronics or batteries - ideal for explosive and underwater environments

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Two ways to use

Conventional mode

- Rotate the dial counterclockwise
- Press the button to place the magnet against the surface
- Slowly rotate the dial clockwise in a single motion
- Record the position of the indicator at pull-off

Go/ No-Go Mode

- Rotate the dial to the required coating thickness
- Press the button to place the magnet against the surface

- If the magnet ‘sticks’, the coating is less than the required thickness.
- If the magnet fails to ‘stick’, the coating is equal to or greater than the required thickness

PosiTest DFT

Coating Thickness on Metals

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PosiTest® DFT

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- An economical choice that retains the uncompromising quality of DeFelsko inspection instruments
- Features advanced PosiTector 6000 probe technology
  - ✓ See PosiTector 6000 section for details
- Ideal for entry-level users, including: Powder coaters, Paint Applicators, Coating inspectors, Automotive professionals

Two models

Model	Common Applications
PosiTest DFT ***Ferrous***	Steel substrates
PosiTest DFT ***Combo***	All metal substrates

PosiTest® DFT

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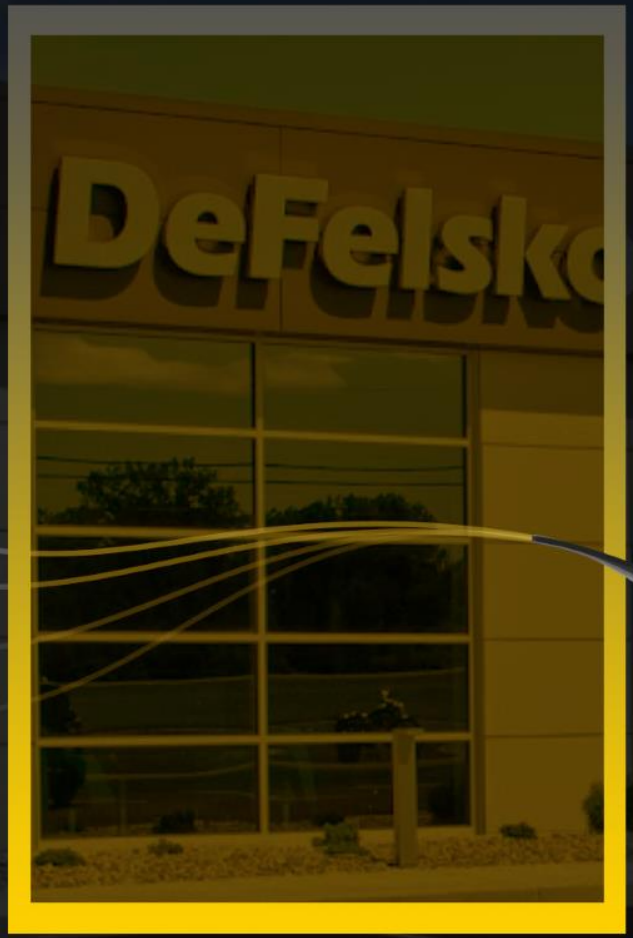
Selling points

- PosiTector 6000 probe technology in a simple, economical platform
  - ±3% accuracy (PosiTector 6000: ±1%)
- No calibration adjustment required for most applications
  - Measures accurately out of the box
- Handy RESET feature to restore factory settings and calibration
- Uses a single AAA battery
- Two year warranty
- Included hard-shell storage case and calibration certificate



The PosiTector Platform

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The PosiTector Platform

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- All PosiTector probes fit onto all gage bodies – complete interchangeability
- The probe is factory calibrated and the calibration is stored inside the probe, not the gage body
- More economical for customers who want more than one probe (kits), or who want to upgrade
- Extensive, growing, probe selection:

- ✓ **PosiTector 6000-** Coating Thickness on Metals
- ✓ **PosiTector 200-** Coating Thickness on non-Metals
- ✓ **PosiTector UTG-** Wall/ Material Thickness
- ✓ **PosiTector DPM-** Environmental Conditions
- ✓ **PosiTector IRT-** Infrared Thermometer
- ✓ **PosiTector RTR-** Replica Tape Surface Profile
- ✓ **PosiTector SPG-** Surface Profile Gage
- ✓ **PosiTector SHD-** Shore Hardness Durometer
- ✓ **PosiTector BHI-** Barcol Hardness Impressor
- ✓ **PosiTector SST-** Soluble Salt Contamination

The PosiTector Platform

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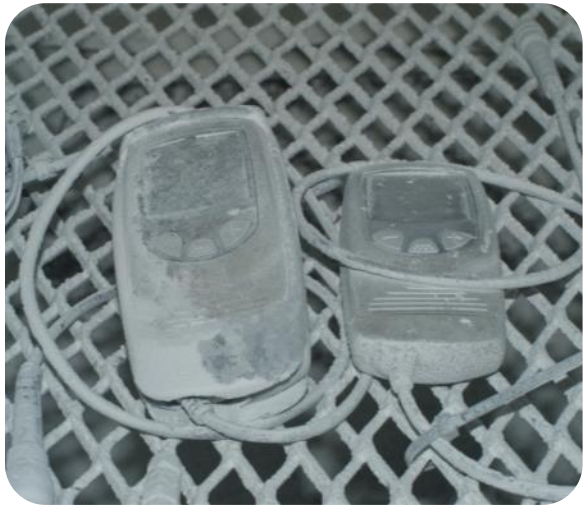
- Built tough! Made from solvent, acid, and oil resistant plastics
- Sealed to IP65 standard- splash resistant and dustproof



The PosiTector Platform- Standard vs Advanced

Two gage bodies- Standard and Advanced:

Standard Body

- Storage of 250 readings per probe, in one batch
- USB port for downloading stored readings

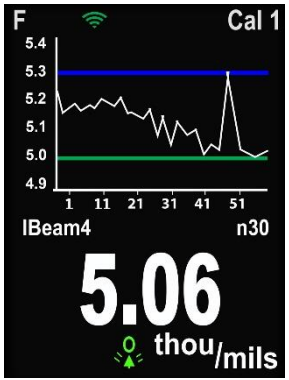
Advanced Body

- Storage of up to 100,000 readings in up to 1000 batches and sub-batches
- USB port for downloading stored readings
- USB to serial real-time data streaming
- WiFi Technology- wirelessly upload stored measurements to PosiSoft.net and download software updates
- Bluetooth 4.0 low-energy technology- seamlessly transfer readings to the PosiSoft mobile app (iOS and Android) for further reporting, or print to the optional handheld printer
- And additional features…

The PosiTector Platform- Advanced Body

Additional Advanced Gage Body Features

- Live, on-screen charting and batch summary display
- Batch annotation- create meaningful batch names and enter notes using a familiar on-screen QWERTY keyboard



- Probe-specific additional features

For example, for the PosiTector 6000:

- Scan mode- take continuous readings without lifting the probe
- SSPC PA2 & PSPC 90/10 features- easily analyze large areas using statistical methods
- Multiple stored calibration adjustments

The PosiTector Platform- SmartLink

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- PosiTector SmartLink and free mobile app turn your cell phone or tablet into a virtual PosiTector gauge
  - ✓ Auto-pairing Bluetooth Low Energy connection works up to 10m away
- Every reading is transmitted to your smart device
- Accepts most PosiTector 6000, DPM, SPG, and RTR probes
- Capture images with your device's camera, and annotate using drawings tools
- Create professional, custom PDF reports quickly and easily
- AutoSync mode instantly backs up every reading to the cloud – no account required!

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PosiTector – Drone/Robotic Integration

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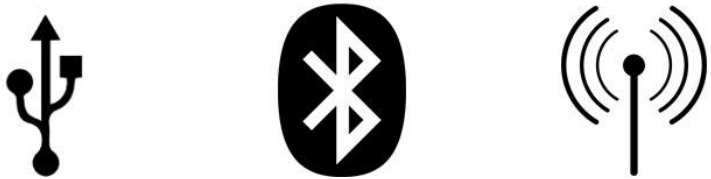
- PosiTector Advanced models integrate with third-party software, drones, ROVs, PLCs, and robotic devices using several industry-standard communication protocols:
  - USB Keyboard mode
  - WiFi Streaming
  - Bluetooth® Low Energy Streaming
  - USB Serial Streaming
  - FTP Auto Log
  - Wifi Server Mode



PosiTector 6000

Coating Thickness on Metals

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PosiTector® 6000 – History

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The 6th generation of PosiTector 6000, building upon decades of experience in coating thickness measurement

1979

A: 1993

1996

B: 1997
C: 2001

D: 2006

E: 2011

PosiTector® 6000 – Overview

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A wide selection of fully interchangeable ferrous, non-ferrous and combination probes ideal for different shapes and thickness ranges

- High accuracy
- Tight, small areas
- Highly abrasive coatings
- Up to 63.5mm coating thickness
- Up to 250ºC surface temperature
- All probes feature Fast and Scan mode

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PosiTector® 6000 – Overview

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Underwater Coating Thickness Measurement

All **PosiTector *6000*** regular separate probes are suitable for underwater measurement and are available with extended cable lengths up to 75 meters / 250 feet.

(90° regular probe shown)

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PosiTector® 6000 – Overview

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Ideal for measuring coating thickness on underwater pipes, ships, bulkheads, offshore oil rigs or anywhere extended reach is required.

Maximum cable lengths vary depending on probe type...

- **F** (ferrous) (FS, FRS, FTS, FTRS) – up to 250 ft (75 m)
- **N** (non-ferrous) (NS, NAS, NRS) – up to 50 ft (15 m)
- **FN** (ferrous/non-ferrous) (FNS, FNRS, FNDS) – up to 50 ft (15 m)

Extended cable lengths are also available for ferrous micro probes (F0S, F45S, F90S) and FKS probes (thick coatings) – up to 50 ft (15 m).

Note: Micro probes and FKS probes do not support underwater usage
~ 2 week lead time for extended probes

(90° regular probe shown)

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		Our most popular Integral and Cabled probe models		90° Regular probe for tight spots	Ideal for duplex coating systems	Ideal for hot and rugged applications	Ideal for anodized aluminum	Microprobes – Our smallest probes for small parts or hard-to-reach areas				Integral and Cabled probes for thick protective coatings; epoxy, rubber, intumescent fireproofing and more							
																			
FERROUS	Standard	F1	FS1	FRS1		FXS1[1]		F0S1	F45S1	F90S1	F90ES1	FT1	FTS1	FTRS1	FHXS1[1, 2]	FKS1	FJS1	FLS1	
	Advanced	F3	FS3	FRS3		FXS3[1]		F0S3	F45S3	F90S3	F90ES3	FT3	FTS3	FTRS3	FHXS3[1, 2]	FKS3	FJS3	FLS3	
NON-FERROUS	Standard	N1	NS1	NRS1			NAS1	N0S1	N45S1	N90S1						NKS1			
	Advanced	N3	NS3	NRS3			NAS3	N0S3	N45S3	N90S3						NKS3			
COMBINATION	Standard	FN1	FNS1	FNRS1	FNDS1[3]								FNTS1						FNGS1[4]
	Advanced	FN3	FNS3	FNRS3	FNDS3[3]								FNTS3						FNGS3[4]
Range		0–60 mils 0–1500 µm				0–80 mils 0–2000 µm	Ferrous: 0–45 mils and 0–1150 µm Non-Ferrous: 0–25 mils and 0–625 µm					0–250 mils 0–6 mm			0–400 mils 0–10,000 µm	0–500 mils 0–13 mm	0–1.0 in. 0–25 mm	0–1.5 in. 0–38 mm	0–2.5 in. 0–63.5 mm
Accuracy[5]		±(0.05 mil + 1%) 0-2 mils ±(0.1 mil + 1%) >2 mils ±(1 µm + 1%) 0-50 µm ±(2 µm + 1%) >50 µm					±(0.02 mil + 1%) 0-4 mils ±(0.1 mil + 3%) >4 mils ±(0.5 µm + 1%) 0-100 µm ±(2 µm + 3%) >100 µm					±(0.5 mil + 1%) 0-100 mils ±(0.5 mil + 3%) >100 mils ±(0.01 mm + 1%) 0-2.5 mm ±(0.01 mm + 3%) >2.5 mm			±(0.1 mil + 3%) ±(2 µm + 3%)	±(1 mil + 3%) ±(0.02 mm + 3%)	±(0.01 in. + 3%) ±(0.2 mm + 3%)		
Matching DeFelsko Calibration Standards		STDS1 STDA1				STDS4	STDS2 STDA2					STDP1			STDP7	STDP5	STDP2	STDP8	

Ferrous probes *measure non-magnetic coatings on ferrous metals.* ***Non-Ferrous probes*** *measure non-conductive coatings on non-ferrous metals. 1)* ***FXS/FHXS Xtreme probe series*** *with Alumina wear face and braided cable — ideal for rough or hot surfaces up to 250˚C (500˚F). 2)* ***FHXS probe*** *measures non-conductive coatings on steel only. 3) See website for full* ***FNDS probe*** *accuracy information. 4)* ***FNGS probe*** *measures non-conductive coatings on all metals. 5) Accuracies are stated as a fixed value plus a percentage of the gage's actual reading.*

PosiTector® 6000 – Probe Technology

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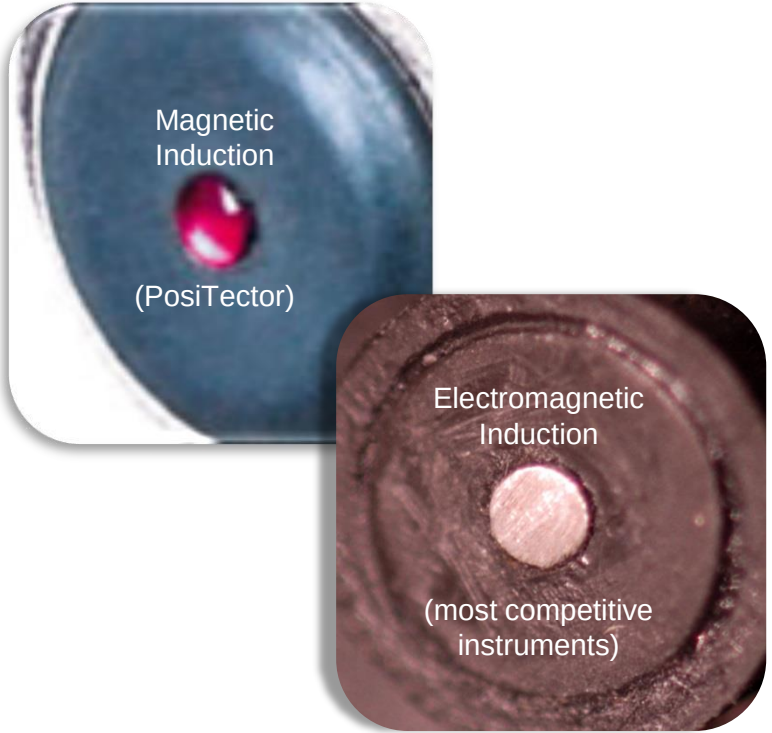
- The most common PosiTector 6000 probes use industry leading **Magnetic Induction** probe technology

- Relies on a permanent rare-earth magnet and hall (magnetism) sensor protected by a wear-resistant ruby
  - ✓ Versus electromagnetic induction, which relies on a thin coil of wire around a soft metal rod
  - ✓ Most competitors use electromagnetic induction- much cheaper to build



PosiTector® 6000 – Probe Technology

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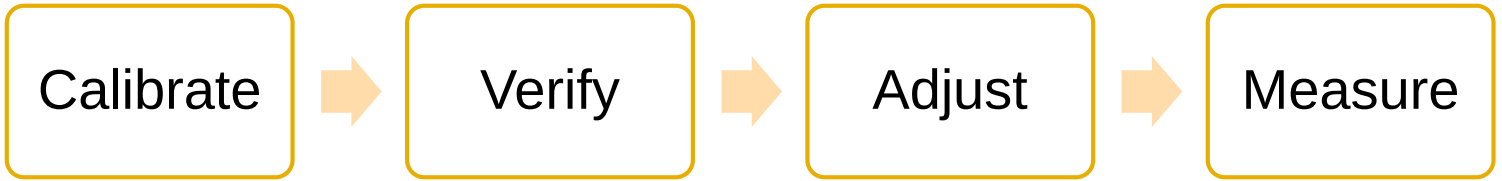
Advantages

- Probe reads in-tolerance throughout its entire range- out of the box!
- Probe tip doesn't wear- no calibration 'drift' over time
  - 'Reset' feature restores factory calibration- even after extended use
- No calibration adjustment for most applications
  - No more 2-point adjustments!
- Longer-lasting probes don't 'wear out'
- Readings are more accurate, but slightly less precise

PosiTector® 6000 – Four Measuring Steps

For best accuracy, ASTM D7091 and SSPC PA2 define the following four operational steps for all coating thickness gages.



PosiTector® 6000 – Four Measuring Steps

Calibration

Typically performed by the manufacturer or by an accredited lab

Verification of Accuracy

An accuracy check performed by the user on known reference standards

Adjustment (if necessary)

Align the gage's thickness readings to match those of a known sample

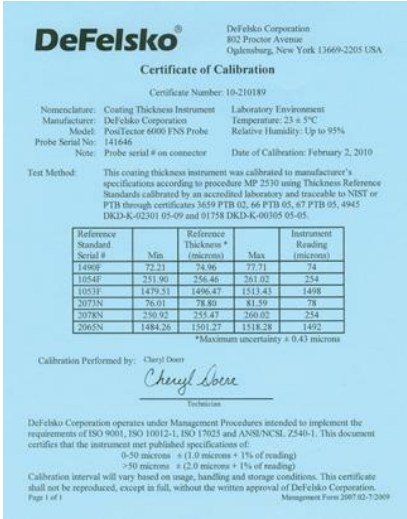
Measurement

Measure according to the Contract Specification or follow guidelines outlined in PA2, PA9, PSPC, etc.

PosiTector® 6000 – Four Measuring Steps

1. Calibration

"Calibration of coating thickness gages is performed by the equipment manufacturer, an authorized agent, or by an certified calibration laboratory in a controlled environment using a documented process." ASTM D7091



DeFelsko®

DeFelsko Corporation
802 Proctor Avenue
Ogdensburg, New York 13669-2205 USA

Certificate of Calibration

Certificate Number: 10-210189

Nomenclature:	Coating Thickness Instrument	Laboratory Environment	
Manufacturer:	DeFelsko Corporation	Temperature: 23 ± 5°C	
Model:	PosiTector 6000 FNS Probe	Relative Humidity: Up to 95%	
Probe Serial No:	141646		
Note:	Probe serial # on connector	Date of Calibration: February 2, 2010	

Test Method: This coating thickness instrument was calibrated to manufacturer's specifications according to procedure MP 2530 using Thickness Reference Standards calibrated by an accredited laboratory and traceable to NIST or PTB through certificates 3659 PTB 02, 66 PTB 05, 67 PTB 05, 4945 DKD-K-02301 05-09 and 01758 DKD-K-00305 05-05.

Reference Standard Serial #	Min	Reference Thickness * (microns)	Max	Instrument Reading (microns)
1490F	72.23	74.96	77.71	74
1054F	251.90	256.46	261.02	254
1053F	1479.51	1496.47	1513.43	1498
2073N	76.01	78.80	81.59	78
2078N	250.92	255.47	260.02	254
2065N	1484.26	1501.27	1518.28	1492

*Maximum uncertainty ± 0.43 microns

Calibration Performed by: Cheryl Doerr

Cheryl Doerr
Technician

DeFelsko Corporation operates under Management Procedures intended to implement the requirements of ISO 9001, ISO 10012-1, ISO 17025 and ANSI/NCSL Z540-1. This document certifies that the instrument met published specifications of:

0-50 microns ± (1.0 microns + 1% of reading)
>50 microns ± (2.0 microns + 1% of reading)

Calibration interval will vary based on usage, handling and storage conditions. This certificate shall not be reproduced, except in full, without the written approval of DeFelsko Corporation.

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PosiTector® 6000 – Four Measuring Steps

2. Verification of Accuracy

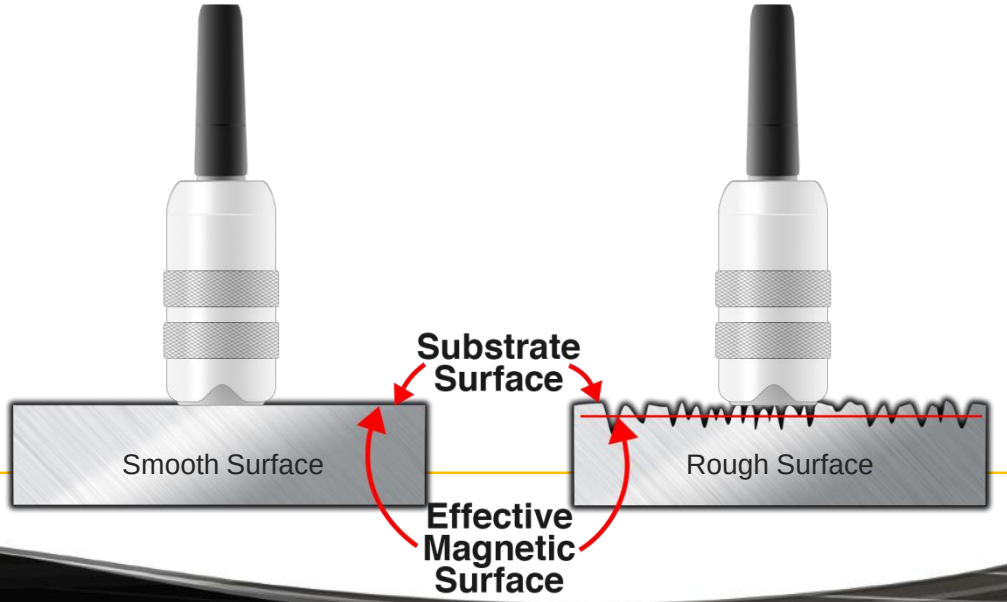
An accuracy check performed by the user on known reference standards covering the expected range of coating thickness. The process is intended to verify that the gage is functioning as expected.

PosiTector® 6000 – Four Measuring Steps

3. Adjustment – Why?

To compensate for the effects of properties of the substrate

- **roughness**
- shape
- composition
- mass



PosiTector® 6000 – Four Measuring Steps

3. Adjustment – When?

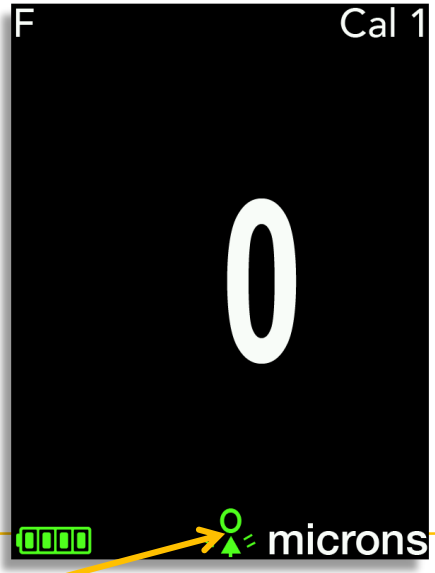
When the gage does not read “0” on the uncoated part or does not read the thickness of a shim placed over the customer’s uncoated substrate.

PosiTector® 6000 – Four Measuring Steps

3. Adjustment – How?

Three types of adjustments

1-Point Adjustment to zero	1-Point Adjustment to a known thickness	2- Point Adjustment
•Adjust to zero on the uncoated substrate •Ideal for compensating for most substrate properties	•Ideal when compensating for substrate roughness - place a shim on the uncoated substrate -adjust to the shim's thickness	•Adjust to two known thicknesses, one point below and one point above the expected thickness range •Rarely necessary on the PosiTector 6000



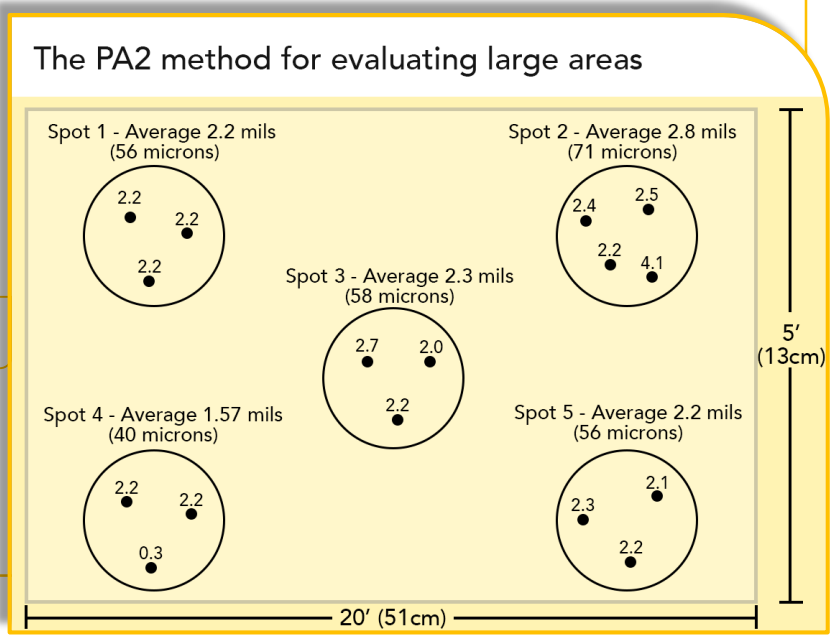
PosiTector® 6000 – Four Measuring Steps

4. Measure – 3 approaches

1. Take a single reading

2. Calculate the average of several readings
   - Statistics mode

3. Analyze a larger area using a statistical approach
   - PA2 Mode (Advanced models only)
     - See defelsko.com/PA2
   - 90/10 Mode (Advanced models only)
     - See defelsko.com/9010



Stainless Steel & Partially Magnetic Substrates

- Partially magnetic substrates can be challenging, since the weak magnetic field makes the probe 'seem' further away from the substrate than it is
- The PosiTector 6000 FN probe is uniquely able to measure on most grades of Stainless Steel
  - Why? There is a permanent magnet inside the probe, and N-Lock mode

- How to measure:

Check Zero on the uncoated part, and perform a Zero adjustment if necessary. If the instrument measures zero consistently, inspect with confidence.

If there is no consistent zero, turn on N-lock mode. Then measure zero, and perform a zero adjustment if necessary. If the instrument measures zero consistently, inspect with confidence.

PosiTector® 6000 – FNDS Duplex Probe

- A duplex system of galvanizing and polymer coating has been found to provide excellent corrosion resistance, and to exceed the lifespan of either coating used alone
- The PosiTector 6000 FNDS probe simultaneously measures the individual thicknesses of zinc and paint in a duplex coating system with a single reading
  - ✓Ideal for measuring hot-dip, electro, and zinc spray galvanizing
- When taken out of duplex mode, can be used as a conventional ferrous/non-ferrous instrument
- Scan mode- take continuous readings without lifting the probe

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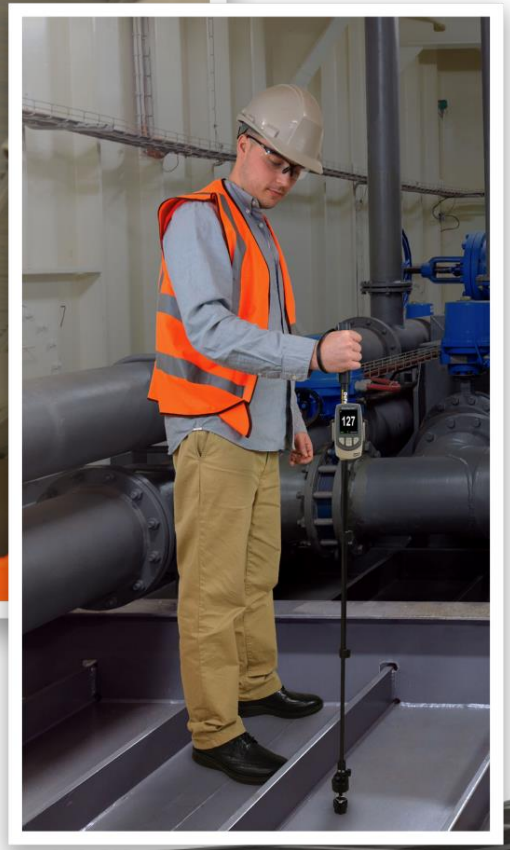
New Product: Telescopic Probe Extender

Redesigned-Lightweight device
extends the reach of DFT probes

Removable Articulating Probe Holder



New Product: PosiTector 6000 F90ES

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New PosiTector 6000 FJS

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For Thick Protective Coatings on Steel

NEW

- Ideal for measuring thick epoxies, rubbers, fireproofing and other thick protective coatings applied to steel.
- Lightweight, ergonomic design - 66% smaller than comparable probes
- Electro-magnetic probe is less susceptible to the effects of substrate roughness, curvature, material, and alloy

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New Redesigned PosiTector 6000 FXS Xtreme

For Hot Surfaces & Rugged Applications

- Now able to measure on hot surfaces up to 250˚ C (500˚ F)
- New braided stainless steel cable
- Increased measuring range 0 – 2000 µm (80 mil)
- Wear-resistant probe face, ideal for scanning applications and rough coatings
- Fast measurement speed – 100+ readings per minute (200+ readings per minute in scan mode, *Advanced models only*)

New S4 Certified Coated Metal Plate Standard

New **S4 Standard** (STDS4) features four epoxy-coated steel plates with nominal coating thicknesses of 0, 75, 1000, and 1900 µm (0, 30, 40, and 75 mils) mounted in a protective binder.

Ideal for the new **PosiTector *6000 FXS*** probe's increased range of 0 – 2000 µm (0 – 80 mil)

New PosiSoft Prompted Batch Mode

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Prompted Batch Mode for PosiSoft

NEW

- Create pre-defined batches in PosiSoft Desktop with onscreen text and image prompts for each reading, then upload to PosiTector *6000* gages.
- Ideal for ensuring a consistent measurement pattern for repetitive jobs or when specific measurement locations are required
- Create and store multiple templates for different jobs
- Create. Upload. Measure.

PosiTector® 6000 – Competitive Advantages

PosiTector platform	DeFelsko probe technology	Included Certificate of Calibration Traceable to NIST	Full two year warranty on body and probe	DeFelsko service - quick shipping, recalibration, and repair
• Fully interchangeable probes • Often, competitive 'interchangeable' probes require specific body models • Free software, and USB, WiFi, and Bluetooth	• Longer lasting • Holds factory calibration • No calibration adjustment (for most applications)	• More than a 'Certificate of Accuracy'- contains measurements from the probe on traceable standards • An extra charge (and delay) from most competitors	• Many competitors offer a much shorter warranty on the probe- the most important part	

PosiTector 200

Coating Thickness on Non-Metals

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PosiTector® 200 – History

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For nearly 25 years, DeFelsko has been the market leader in Ultrasonic coating thickness measurement

First Generation
PosiTector 100 (1993)
Primarily Intended for thicker coatings on concrete and wood

Second Generation
PosiTector 100 (1999)
Individual layer thicknesses, thinner coatings

Third Generation
PosiTector 200 (2003)
Simpler to operate, more affordable

Fourth Generation
PosiTector 200 (2006)
More advanced capabilities, graphing

Fifth Generation
PosiTector 200 (2012)
Probe interchangeability

PosiTector® 200 – Overview

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Testing & Measuring Everything

Ideal for measuring up to three layers of coatings on concrete, wood, plastic, and more

- Proven non-destructive technique conforms to ASTM D6132, ISO 2808 and SSPC-PA9
- Ready to measure- no adjustment required to measure most coatings
- Measures the total thickness of the coating system, or up to three individual layer thicknesses in a multi-layer system (Advanced models only)
- Features a graphical readout, useful for troubleshooting challenging applications (Advanced models only)

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PosiTector® 200 – Probes

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Testing & Measuring Everything

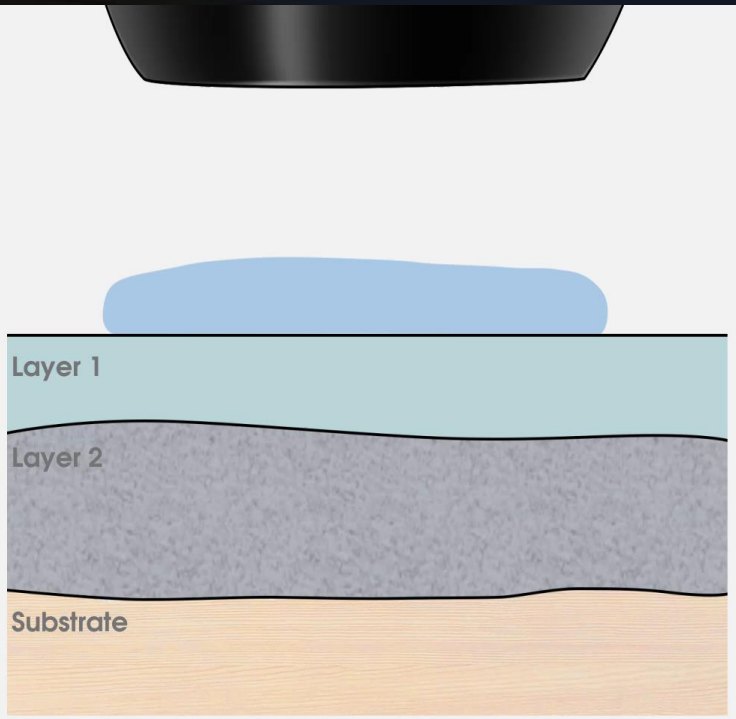
- Three probe models available for a variety of applications
- Consider range AND typical applications- probes use different frequencies designed for different applications.

Select from a variety of measurement ranges			
Probes	200B	200C	200D
Typical Applications	Polymer coatings on wood, plastic, etc.	Coatings on concrete, fiberglass, etc.	Thick, soft coatings such as polyurea, asphaltic neoprene, very thick polymers, etc.
Measurement Range	13 – 1000 µm 0.5 – 40 mils	50 – 3800 µm 2 – 150 mils	50 – 7600 µm 2 – 300 mils
Accuracy	+/- (2 µm + 3% of reading) +/- (0.1 mil + 3% of reading)		+/- (20 µm + 3% of reading) +/- (1 mil + 3% of reading)
Minimum layer Thickness	13 µm 0.5 mil	50 µm 2 mil	500 µm 20 mil

PosiTector® 200 – The Principle of Measurement

Reads the largest “echo” within user-specified range

Dominant echo is usually the coating/substrate interface



PosiTector® 200 – Multiple Layers

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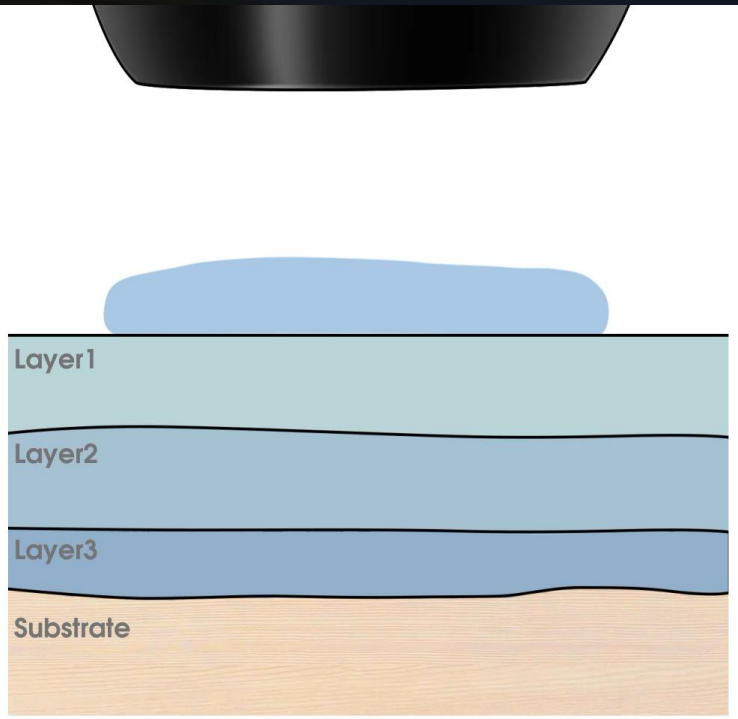
Set the instrument to read the number of anticipated layers

Each layer thickness is reported along with a total thickness



PosiTector® 200 – Application Note: Surface Roughness

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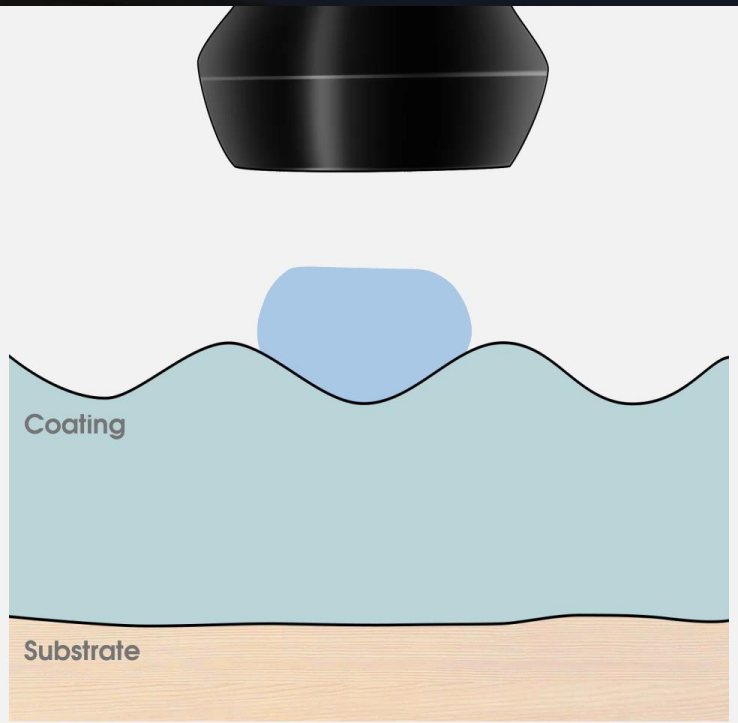
For performance or aesthetics, many coatings are designed to have a rough surface finish

The loudest echo sometimes comes from the surface roughness

Solution: Change the low-range value to ignore that echo



PosiTector 200 –
Application Note: Non-Homogeneous Coatings

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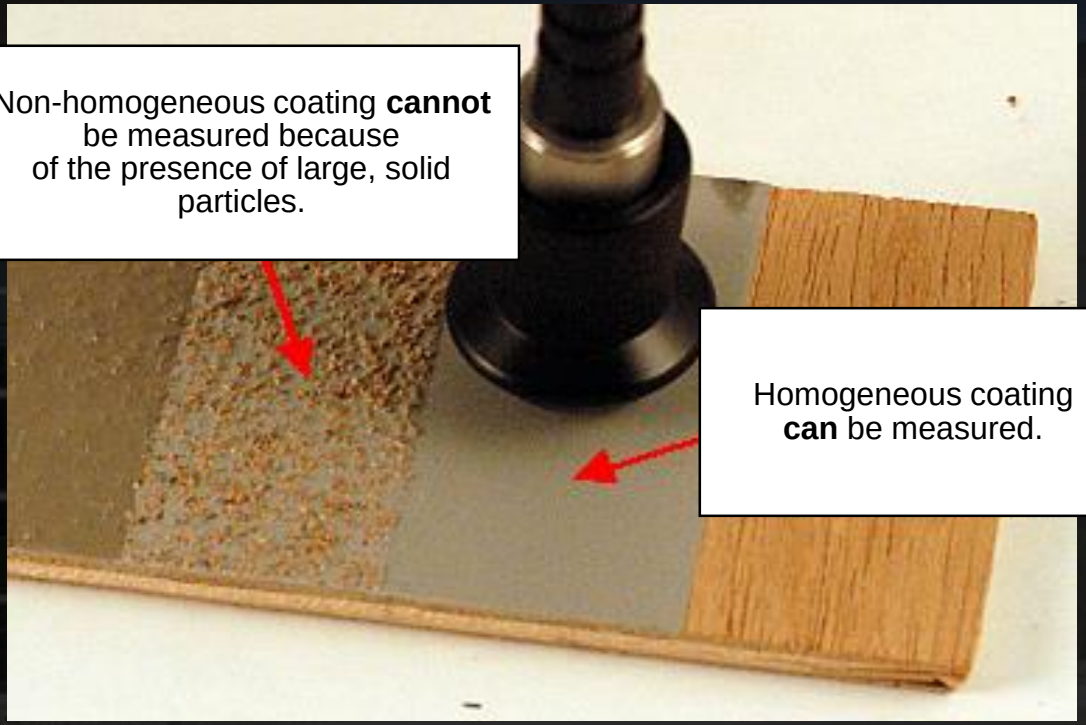

PosiTector® 200 – Application Note: Coatings on Metals

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- In general, the PosiTector 200 is not ideal for metal substrates
  - There are no test methods for the ultrasonic measurement of coatings on metal substrates
  - PosiTector 6000 probes are less expensive, designed for the application, and don't require couplant
- For a single layer of coating on metal substrates, the PosiTector 200 generally works well
  - The PosiTector 200 coating thickness standards have metal substrates
- Multiple layer applications are challenging- the loud echo off the metal substrate 'overwhelms' the smaller echoes between the layers, making them unreadable.
  - Application dependent
  - Increased minimum layer thickness of > 125 µm (4.9 mils)

Certified Coated Metal Plates

New – Max Thick Mode

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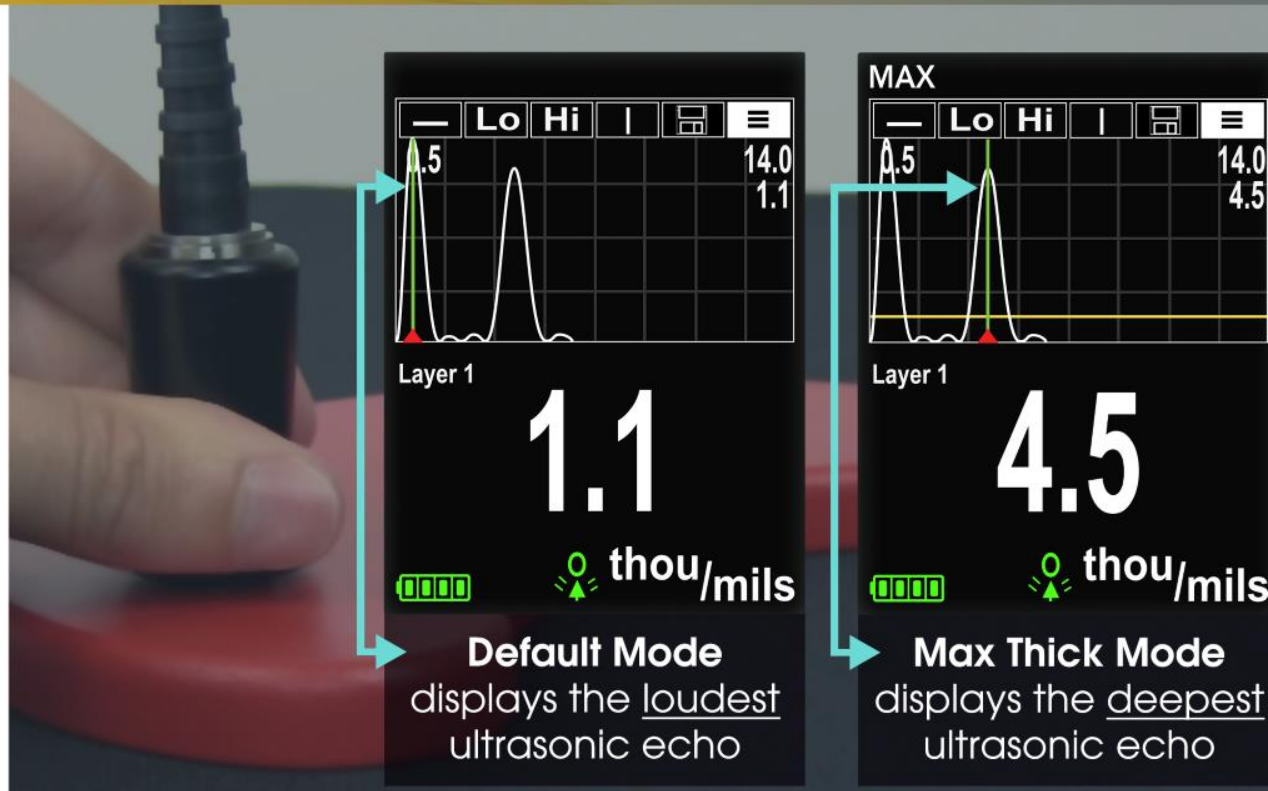
Ideal for ignoring unwanted surface echoes and eliminates the need to adjust the Lo Range when measuring rough coatings



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Instructional Demo

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Quick Start

1. Remove the protective rubber cap from the probe
2. Power-up the Gage by pressing the center navigation button
3. Zero the probe
4. Verify accuracy and adjust if necessary
5. Apply couplant to the surface of the part
6. Measure the part

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Instructional Demo – Max Thick Mode

1. Reset Gage: Menu -> Setup -> Reset
2. Zero the probe: Menu -> Cal Settings -> Zero
3. Enable Graphics: Menu -> Setup -> Graphics
4. Max Thick Mode: Menu -> Setup -> Max Thick Mode
5. Exit Menu
6. Apply couplant, measure
7. Increase Low Range:
    1. Use up and down to highlight “Lo”
    2. Press the (+) button to increase Low Range
8. Apply couplant, measure

PosiTector® 200 – Selling Points

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No equal- some competitive attempts, but none feature the range, resolution, ease of use, or multi-layer capability of the PosiTector 200

PosiTector Platform	Included Certificate of Calibration Traceable to NIST	Full two year warranty on body **and probe**	DeFelsko service- quick shipping, recalibration, and repair
• Fully interchangeable probes • Often, competitive 'interchangeable' probes require specific body models • Free software, and USB, WiFi, and Bluetooth	• More than a 'Certificate of Accuracy'- contains measurements from the probe on traceable standards • An extra charge (and delay) from most competitors	• Many competitors offer a much shorter warranty on the probe- the most important part	

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