ISONIC 2009 UPA Scope

Smart Phased Array Ultrasonic Flaw Detector and Recorder with 1 / 8 / 16* Additional Channels for Conventional UT / TOFD

Designed and built under the drive for improved detection, productivity, and reducing of inspection cost **ISONIC 2009 UPA Scope** resolves the well-known nowadays challenges faced by NDT and QA management such as increasing of nomenclature and complexity of inspections combined with more demanding codes, standards, and norms along with significant loss of domain expertise

ISONIC 2009 UPA Scope instrument carries the application based smart platform for the regular and advanced ultrasonic testing delivering

- 5 inspection modalities – PA, TOFD, CHIME, SRUT GW, conventional UT and a combination of them
- built-in image guided scan plan creator (ray tracer) for the numerous types of simple and complex geometry welds, shafts, bolts, spindles, composite profiles, and the like
- live 3D imaging out of matrix array probes
- outstanding ultrasonic performance and probability of detection
- simplicity and intuitiveness of operation and data interpretation
- rapidness in the creation of the new inspection solutions and procedures
- easily expandable on-board solutions base
- reduced training time and cost
- comprehensiveness of automatically created inspection reports

The optimal suitability of **ISONIC 2009 UPA Scope** for resolving of the huge variety of inspection tasks for all industries and processes involving ultrasonic NDT are strongly backed by the above listed features and technical particulars and specs below

the right image is worth a thousand words

ISONIC 2009 UPA Scope

- Flaw Detection and Thickness / Corrosion Mapping
- True-To-Geometry Volume Overlay and 3D Coverage and Imaging for:
  - Butt Welds (Planar and Circumferential) with
    - Symmetrical or Asymmetrical Bevel or Unbeveled
    - Equivalent or Different Thickness of Jointed Parts
  - Longitudinal Welds
  - Fillet, Tee-, and TKY- Welds - Flat and Curved Parts
  - Corner and Nozzle Welds
  - Open Corner and Edge Welds
  - Lap Joints
  - Elbow and Transit Welds
  - Simple and Complex Geometry Solid and Hollow Shafts and Axles
  - Drill Rods, Bridge Hanger Pins, Bolts
  - Turbine Blades
  - Flat and Curved Carbon Fiber, Glass Fiber, Honeycombs Parts Including Corners and Radius Areas
  - etc
- TOFD
- CHIME (Creeping & Head Wave Inspection Technique)
- SRUT GW (Short Range Guided Wave)
- Operating 1 or 2 PA Probes Simultaneously: No External Splitter Required
- Versatile Fully Parallel PA Functionality Out of the Same Unit for ISONIC 2009 Models with two PA Probe terminals:
  - 2 X 32:32
  - 1 X 64:64
  - 2 X 64:64
  - 1 X 128:128
- Freely Adjustable Emitting and Receiving Aperture
- Testing Integrity :
  - 100% Raw Data Capturing
  - EquPAS – Equalized (Homogenized) Phased Array Ultrasonic Testing Sensitivity Over Entire Scan Plan
  - Scanning Performance Monitoring, On-Line Displaying, and Recording
  - Quantitative Scanning Integrity Report
- Live FMC/TFM
- FD B-Scan (Frequency Domain B-Scan) - Ultrasonic Spectroscopy
- Intuitive User Interface
- Automatic Finding, Sizing, Alarming, and Reporting of the Defects
- Remote Control, Observation of the Indications, Data Acquisition through LAN, Internet, Intranet, 3,4,5G
- and much more...

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Phased Array (PA) Modality:

- Fully parallel 64:64 PA electronics expandable to 128:128**
- 2 PA probe terminals: 1 X 64:64 / 2 X 32:32** - switchable: *there is no external splitter required for operating 2 PA probes simultaneously*
- Ability of work with PA probes carrying up to 128** elements
- Built-In PA Probe / Wedge / Delay Line Editor
- Semiautomatic Routine for Quick Verification of Geometry (Dimensions and Angle), Velocity and Array Placement for wedges with flat and contoured contact face
- Independently adjustable emitting and receiving aperture with parallel firing, A/D conversion, and on-the-fly real time digital phasing
- Phased array pulser receiver with image guided ray tracing / scan plan designer for the numerous types of simple and complex geometry welds, shafts, bolts, spindles, composite profiles, and the like
- 8192 independently adjustable focal laws
- On-the-fly focal law editing ability
- Bi-polar square wave initial pulse: up to 300 Vpp / 100 dB analogue gain / 0.2...25 MHz bandpass / 16 bit 100 MHz ADC / 32 taps smoothly tunable digital filter
- Regular and volume overlay true-to-geometry (true-to-shape) B-Scan / Sector Scan (S-Scan) / Horizontal Plane S-Scan (CB-Scan) coverage accompanied with all-codes-compliant A-Scan based evaluation
- Multigroup coverage composed of several cross-sectional B- and S-Scans out of the same probe simultaneously
- Interface Echo start
- Strip Chart
- Single group and multigroup Top (C-Scan), Side, End View imaging formed through encoded / time-based line scanning, 3D-Viewer
- Single side / both sides weld coverage with use of one PA probe / pair of PA probes
- TOFD Map out of a pair of PA probes
- Top (C-Scan), Side, End View imaging formed through encoded XY- scanning, 3D-Viewer
- Live 3D imaging - real time 3D-Scan composed out of Matrix Array Probes
- Scanning performance monitoring and recording along with inspection data: scanning speed, coupling monitor, and lamination checker under the wedged probe
- Equalized (homogenized) cross sectional coverage sensitivity: *TCG-independent* gain per focal law adjustment providing pure angle gain compensation (AGC) for S-Scan, etc
- DAC, TCG applied to defects imaging and evaluation in real time or at the postprocessing stage (DAC / TCG image normalization)
- Dynamic Focusing
- FMC, TFM, Back Diffraction Technique with / without and Mode Conversion
- Distinguishing and evaluation of diffracted and mode converted signals for defects sizing and pattern recognition
- Operating Linear Array (LA), Ring Array (RA), Daisy Array (DA), Matrix Array (MA), Dual Matrix Array (DMA), Dual Linear Array (DLA), and other PA probes
- Real time three-dimensional imaging (3D-Scan) whilst operating Matrix Array Probes
- FFT signal analysis - Ultrasonic Spectroscopy – for defect pattern analysis and materials structure characterization
- FD B-Scan (Frequency Domain B-Scan) for rapid material structure screening, other special tasks
- 100% raw data capturing
- Automatic alarming defects / generating of editable defects list upon scanning completed
- Advanced defects sizing and pattern recognition utilities

Conventional UT and TOFD:

- 1/8/16* channels
- Single / dual modes of pulsing/receiving for every channel
- Bi-polar square wave initial pulse: up to 400 Vpp / 100 dB analogue gain / 0.2...25 MHz bandpass / 16 bit 100 MHz ADC / 32 taps smoothly tunable digital filter
- Regular A-Scan
- Thickness B-Scan
- True-to-Geometry flaw detection B-Scan – straight / angle beam probes
- CB-Scan
- TOFD
- Strip Chart and Stripped C-Scan
- Parallel or sequential pulsing/receiving and A/D conversion
- DAC, DGS, TCG
- FFT signal analysis - Ultrasonic Spectroscopy
- 100% raw data capturing

ISONIC 2009 UPA Scope

General:

- *Dual Core 1.6 GHz clock 2 GB RAM 128 GB SSD W'7PROEmb on-board control computer*
- *Intuitive User Interface*
- *Single and multi-axis encoder connection*
- *Comprehensive postprocessing and data reporting toolkit*
- *Remote control and data capturing with use of a regular PC with no need in special software*
- *No intake air / no cooling IP 65 light rugged case*
- *Sealed all-functional keyboard and mouse*
- *8.5" bright touch screen*
- *Ethernet, USB, sVGA terminals*

ISONIC 2009 UPA Scope uniquely combines PA, single- and multi-channel conventional UT, and TOFD modalities providing 100% raw data recording and imaging. Along with the intuitive user interface, portability, lightweight, and battery operation this makes it suitable for all kinds of every-day ultrasonic inspections

PA modality is carried by the **fully parallel non-multiplexed 64:64 electronics** with independently adjustable emitting and receiving aperture, each may consist of 1...64 elements when operating one PA probe or 1...32 elements per probe in case of operating two PA probes simultaneously. 2 PA probes terminals allow operating of a pair of PA probes simultaneously with *no need in an external splitter*. 64- and 128-elements PA probes may be used with **ISONIC 2009 UPA Scope** when connected to instrument's terminals through miniature active extenders, which expand the functionality to *fully parallel 2 X 64:64, and 1 X 128:128**(no multiplexing involved)*. The groups of PA probe elements forming emitting / receiving aperture may be fully or partially matching or totally separated allowing maximal flexibility whilst managing the incidence angles, focal distances, types of radiated and received waves including directly reflected and diffracted signals either mode converted or not

Each channel is equipped with own pulser-receiver and A/D converter. Parallel firing, A/D conversion, and "on-the-fly" digital phasing are performed for every possible composition and size of the emitting and receiving aperture so the implementing of each focal law is completed within a single pulsing/receiving cycle providing the **maximal possible speed of material coverage**

ISONIC 2009 UPA Scope allows using of various types PA probes: linear, rings, and daisy arrays (LA, RA, and DA), dual linear arrays (LA), matrix arrays (MA), dual matrix arrays (DMA), etc

In addition to the PA electronics **ISONIC 2009 UPA Scope** carries 1 / 8 / 16* independent conventional channels for regular UT, TOFD, SRUT GW and other types of advanced inspection, imaging, and recording; each channel is capable for both single and dual modes of use

The **top level ultrasonic performance** is achieved through firing PA, TOFD, and conventional probes with bipolar square wave initial pulse with wide-range-tunable duration and amplitude (up to 300 Vpp for PA and 400 Vpp for conventional). The high stability of the initial pulse amplitude within entire duration of the positive and negative half-waves, the extremely short boosted rising and falling edges and the automatic adaptive damping improve the signal to noise ratio and resolution allowing controlling of the analogue gain over the 0…100 dB range for each modality

ISONIC 2009 UPA Scope is a very powerful platform for huge number of the practical PA UT software applications available for the activation at any moment. Thanks to unique ***True-To-Geometry Volume Overlap Coverage and Real Time Imaging*** **ISONIC 2009 UPA Scope** is suitable for high performance inspection of simple and complex geometry welds (butt, longitudinal, fillet, lap, corner, elbow, etc) with scanning from one or both sides simultaneously (when applicable), bolts, bridge hanger pins, wind turbine and other shafts, annular rings, flanges, rails and railway axles and wheels, CRFP and GRFP composite panels and profiled stuff, and the like. Precise and easy reproducible automatic ***Equalizing (Homogenizing) of the Sensitivity within Entire Cross-Section / Volume of the Material*** is provided thanks to the unique TCG-independent angle gain / gain per focal law compensation solution combined with DAC / TCG image normalization. Along with 100% raw data capturing and scanning performance monitoring, on-line displaying, and recording this provides the ***Highest Degree of Testing Integrity***

Thanks to ***True-To-Geometry Volume Overlap Coverage and Imaging*** and ***Equalizing (Homogenizing) of the Sensitivity within Entire Cross-Section / Volume of the Material*** the inspection results produced by **ISONIC 2009 UPA Scope** are ***quickly and easy interpretable and acceptable by the UT Pros and non-Pros as well***

ISONIC 2009 UPA Scope is packed into the IP 65 rugged aluminum case with no intake air or any other cooling means. The large 800X600 8.5" bright screen provides fine resolution and visibility for all types of inspection data presentation at strong ambient light along with the optimized power consumption rate for the outdoor operation

---

* - on special order

** - **ISONIC 2009 UPA Scope** instruments with two PA probe terminals (part ##s SA 804901, SA 804903)

ISONIC 2009 UPA Scope

ISONIC 2009 UPA Scope is fully compliant with the following codes

- *ASME Code Case 2541 – Use of Manual Phased Array Ultrasonic Examination Section V*
- *ASME Code Case 2557 – Use of Manual Phased Array S-Scan Ultrasonic Examination Section V per Article 4 Section V*
- *ASME Code Case 2558 – Use of Manual Phased Array E-Scan Ultrasonic Examination Section V per Article 4 Section V*
- *ASTM 1961– 06 – Standard Practice for Mechanized Ultrasonic Testing of Girth Welds Using Zonal Discrimination with Focused Search Units*
- *ASME Section I – Rules for Construction of Power Boilers*
- *ASME Section VIII, Division 1 – Rules for Construction of Pressure Vessels*
- *ASME Section VIII, Division 2 – Rules for Construction of Pressure Vessels. Alternative Rules*
- *ASME Section VIII Article KE-3 – Examination of Welds and Acceptance Criteria*
- *ASME Code Case 2235 – Use of Ultrasonic Examination in Lieu of Radiography*
- *Non-destructive testing of welds – Ultrasonic testing – Use of automated phased array technology. - International Standard EN ISO 13588:2019*
- *Non-destructive testing of welds — Ultrasonic testing — Use of automated phased array technology for thin-walled steel components. - International Standard EN ISO 20601:2018*
- *Non-Destructive Examination of Welded Joints – Ultrasonic Examination of Welded Joints. – British and European Standard BS EN 1714:1998*
- *Non-Destructive Examination of Welds – Ultrasonic Examination – Characterization of Indications in Welds. – British and European Standard BS EN 1713:1998*
- *Non-destructive Testing — Ultrasonic Testing — Examination for Discontinuities Perpendicular to the Surface. – International Standard ISO 16826:2012*
- *Calibration and Setting-Up of the Ultrasonic Time of Flight Diffraction (TOFD) Technique for the Detection, Location and Sizing of Flaws. – British Standard BS 7706:1993*
- *WI 00121377, Welding – Use Of Time-Of-Flight Diffraction Technique (TOFD) For Testing Of Welds. – European Committee for Standardization – Document # CEN/TC 121/SC 5/WG 2 N 146, issued Feb, 12, 2003*
- *ASTM E 2373 – 04 – Standard Practice for Use of the Ultrasonic Time of Flight Diffraction (TOFD) Technique*
- *Non-destructive testing of welds - Ultrasonic testing - Use of time-of-flight diffraction technique (TOFD). - International Standard EN ISO 10863:2011*
- *Non-Destructive Testing – Ultrasonic Examination – Part 5: Characterization and Sizing of Discontinuities. – British and European Standard BS EN 583-5:2001*
- *Non-Destructive Testing – Ultrasonic Examination – Part 2: Sensitivity and Range Setting. – British and European Standard BS EN 583-2:2001*
- *AD 2000-Merkblatt HP 5/3 Anlage 1:2015-04: Zerstörungsfreie Prüfung der Schweißverbindungen - Verfahrenstechnische Mindestanforderungen für die zerstörungsfreien Prüfverfahren - Non-destructive testing of welded joints – Minimum technical procedure requirements for non-destructive testing methods (Germany)*

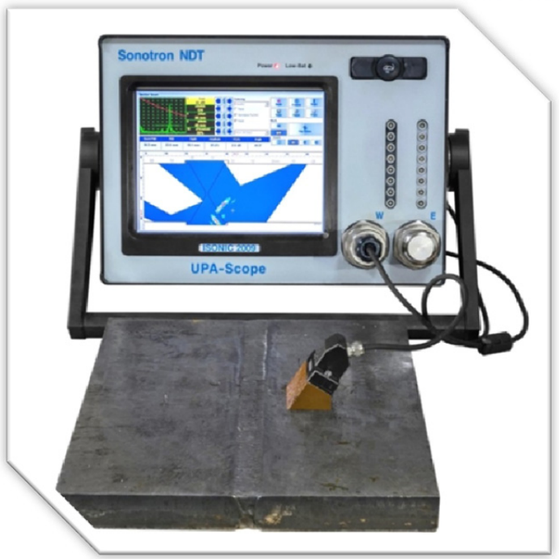
The zero point test and annual verification procedures of **ISONIC 2009 UPA Scope** are fully compliant with the international standards below and the corresponding national norms

PA channels

- *ISO 18563-1. Non-destructive testing — Characterization and verification of ultrasonic phased array equipment. Part 1: Instruments*
- *ISO 18563-3. Non-destructive testing — Characterization and verification of ultrasonic phased array equipment. Part 3: Combined systems*

Conventional channels

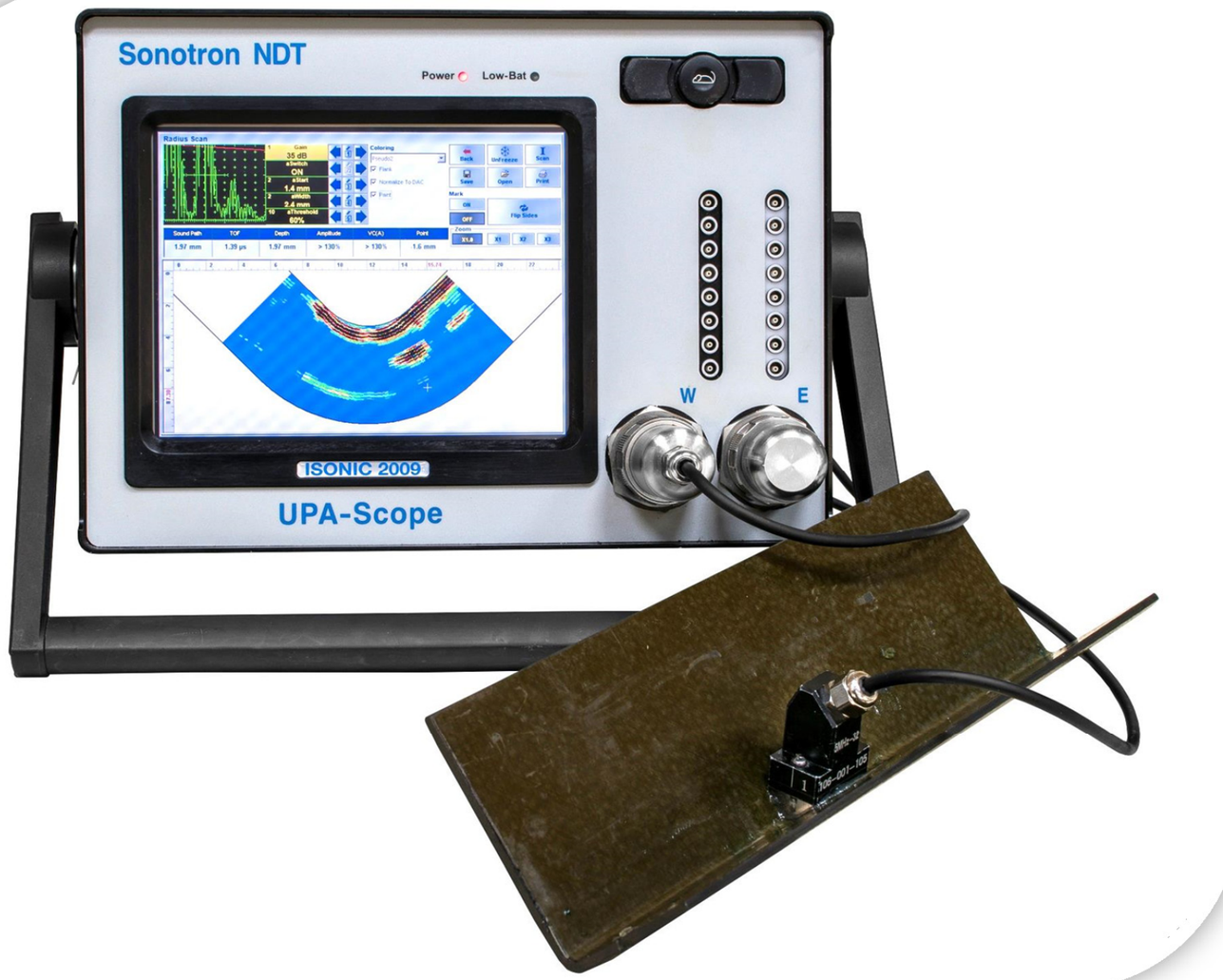
- *EN 12668-1 / ISO 22232-1. Non-destructive testing – Characterization a verification of ultrasonic examination equipment. Part 1: Instruments*
- *EN 12668-3 / ISO 22232-3. Non-destructive testing – Characterization a verification of ultrasonic examination equipment. Part 3: Combined Equipment*



the right image is worth a thousand words

ISONIC 2009 UPA Scope

Aerospace



the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Aerospace

the right image is worth a thousand words

ISONIC 2009 UPA Scope

Aerospace

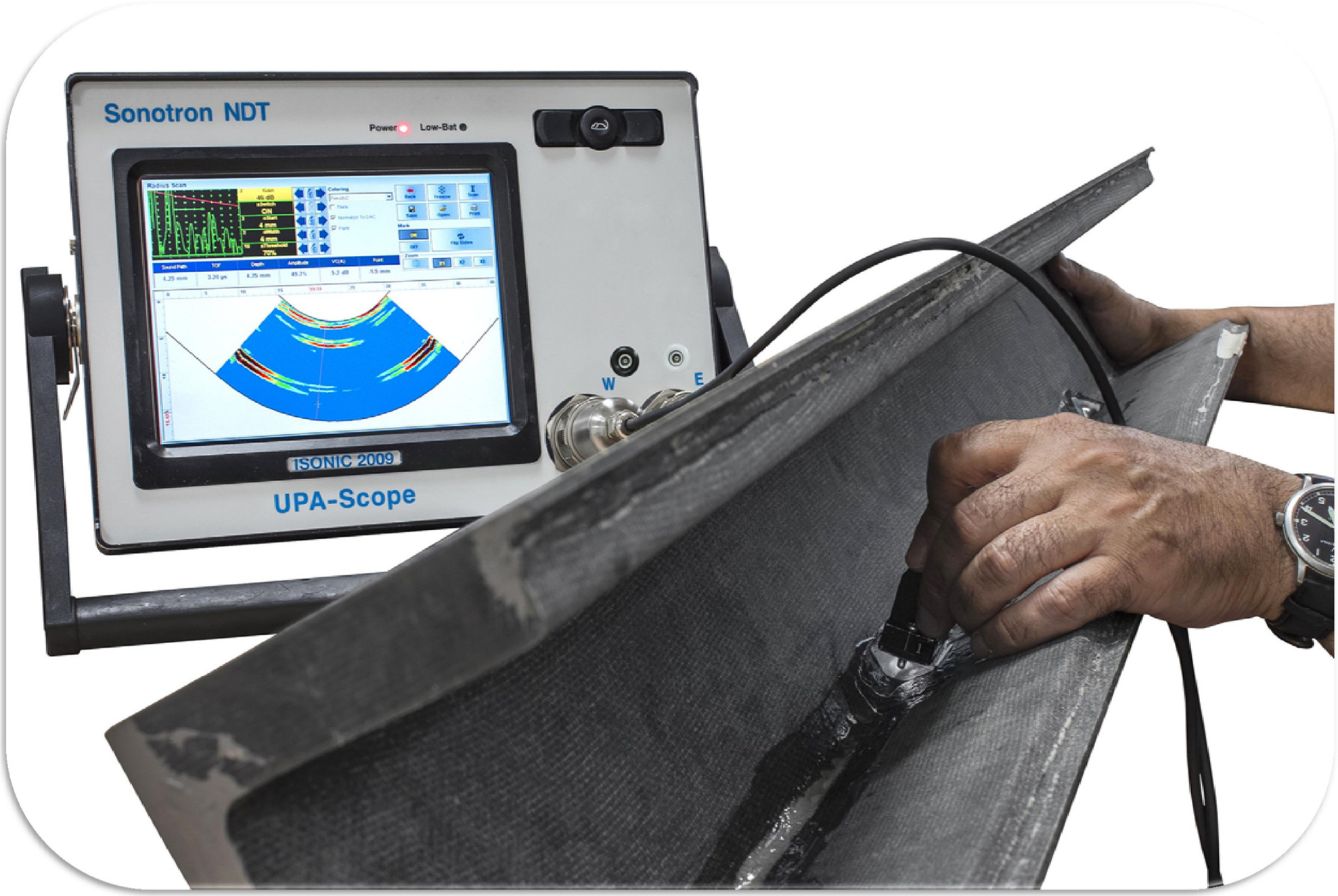
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Aerospace



the right image is worth a thousand words

ISONIC 2009 UPA Scope

Aerospace

the right image is worth a thousand words

ISONIC 2009 UPA Scope

Aerospace

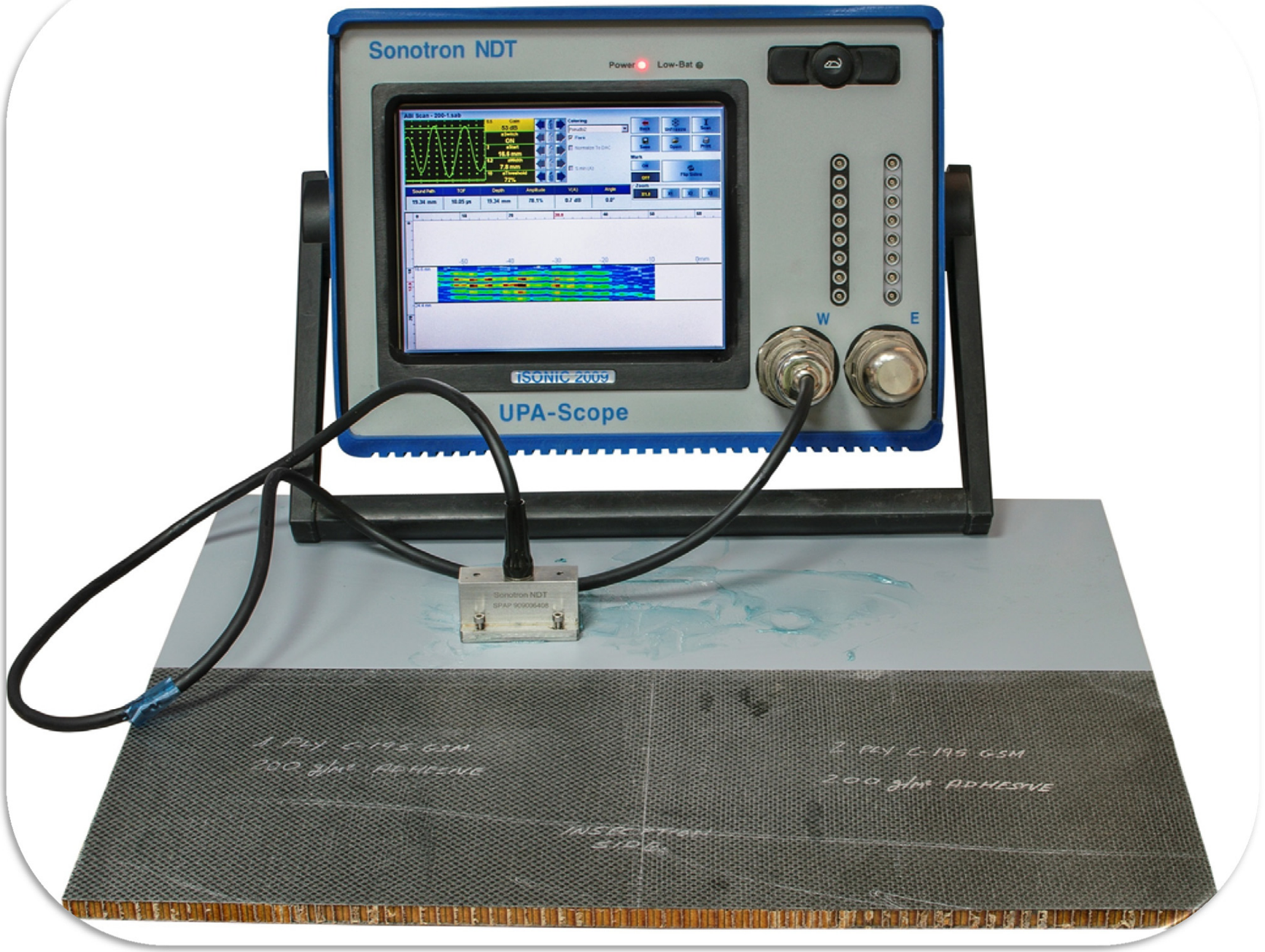
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Aerospace



the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Aerospace

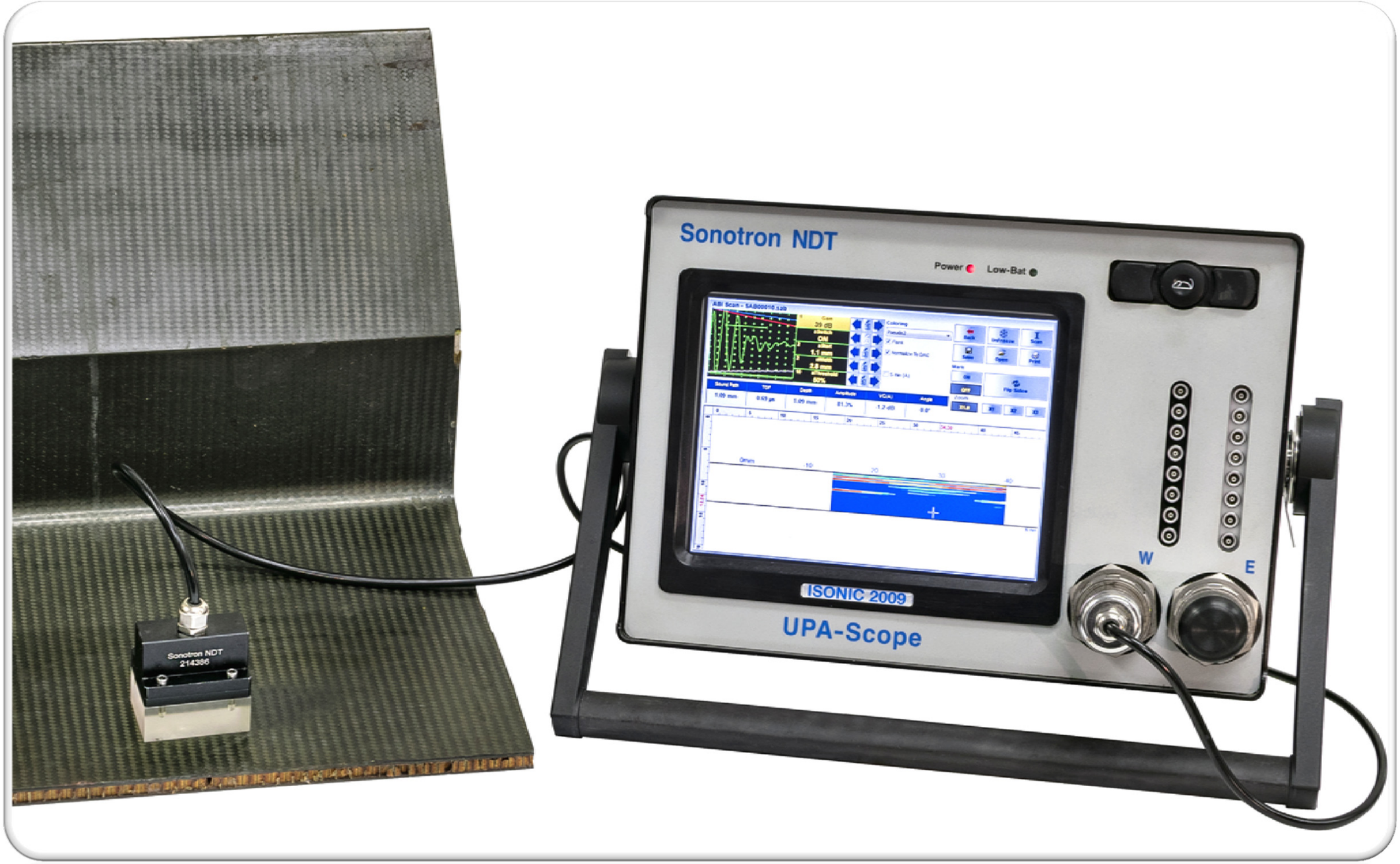
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Aerospace



the right image is worth a thousand words

ISONIC 2009 UPA Scope

AGI – Power, Oil, Gas, Transportation, etc

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

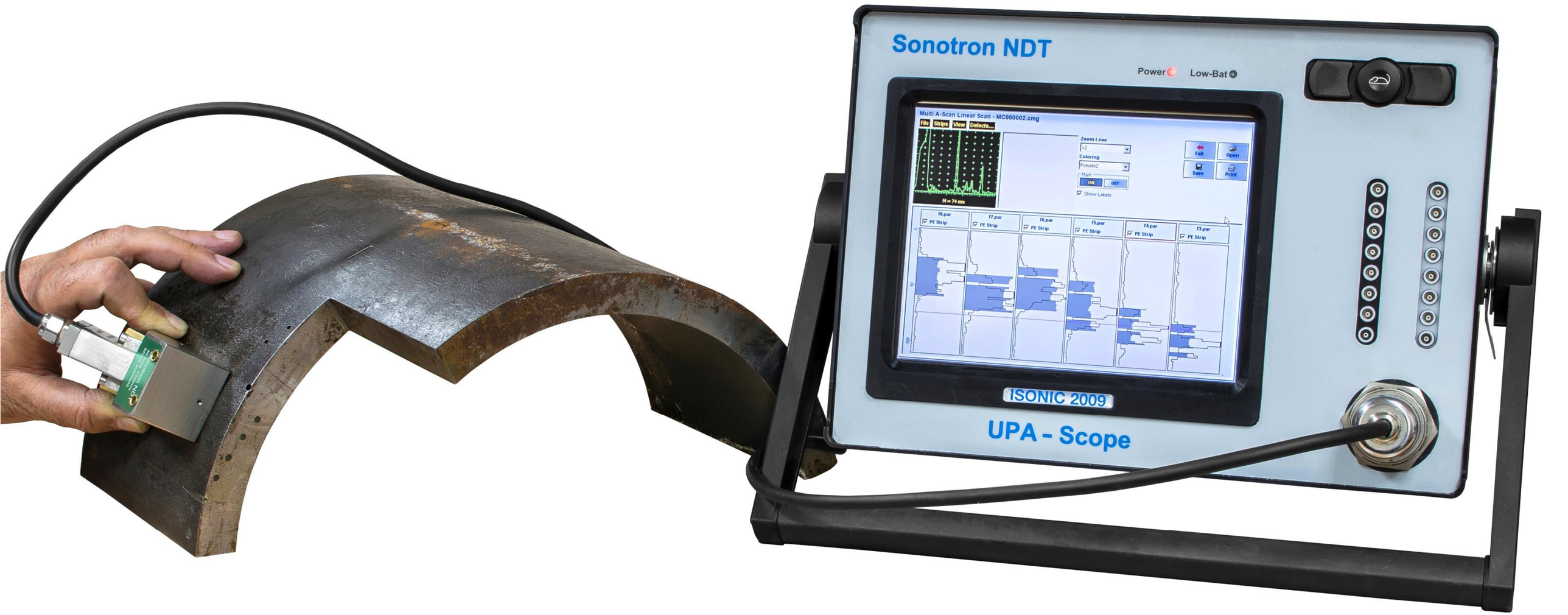
ISONIC 2009 UPA Scope

AGI – Power, Oil, Gas, Transportation, etc

the right image is worth a thousand words

ISONIC 2009 UPA Scope

AGI – Power, Oil, Gas, Transportation, etc



the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

AGI – Power, Oil, Gas, Transportation, etc

the right image is worth a thousand words

ISONIC 2009 UPA Scope

AGI – Power, Oil, Gas, Transportation, etc

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

CRA / Duplex / Super Duplex Welds

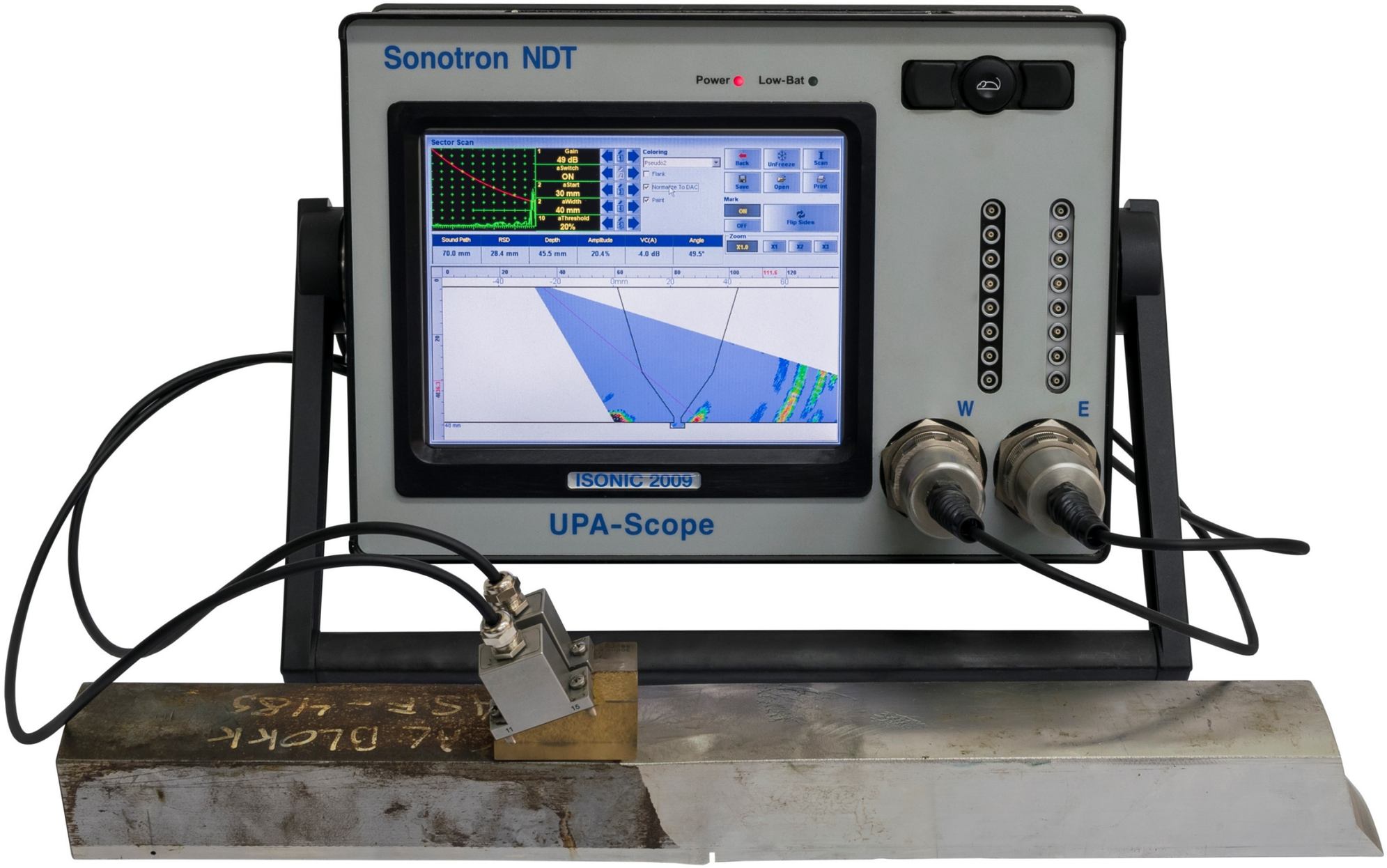
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

CRA / Duplex / Super Duplex Welds



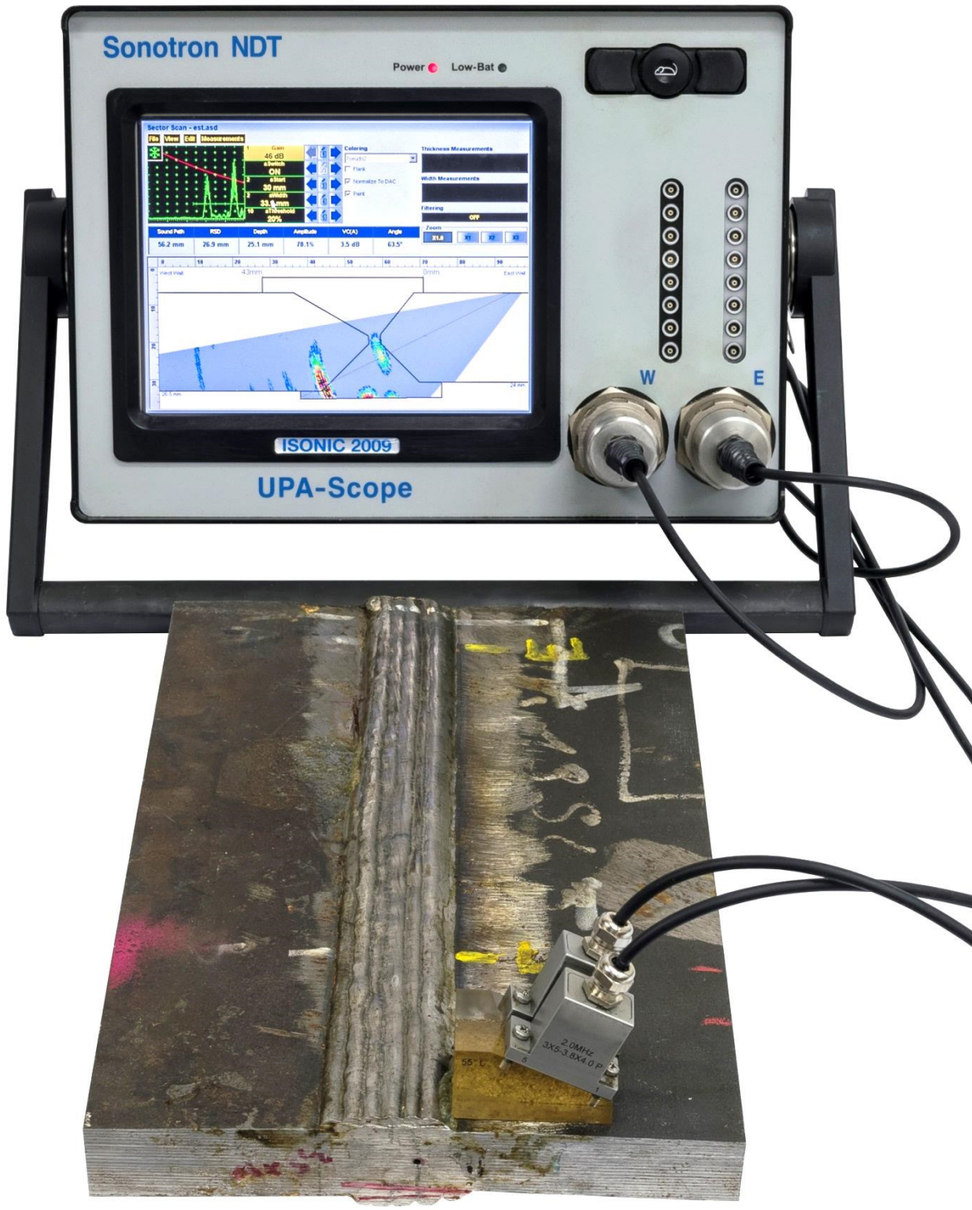
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

CRA / Duplex / Super Duplex Welds



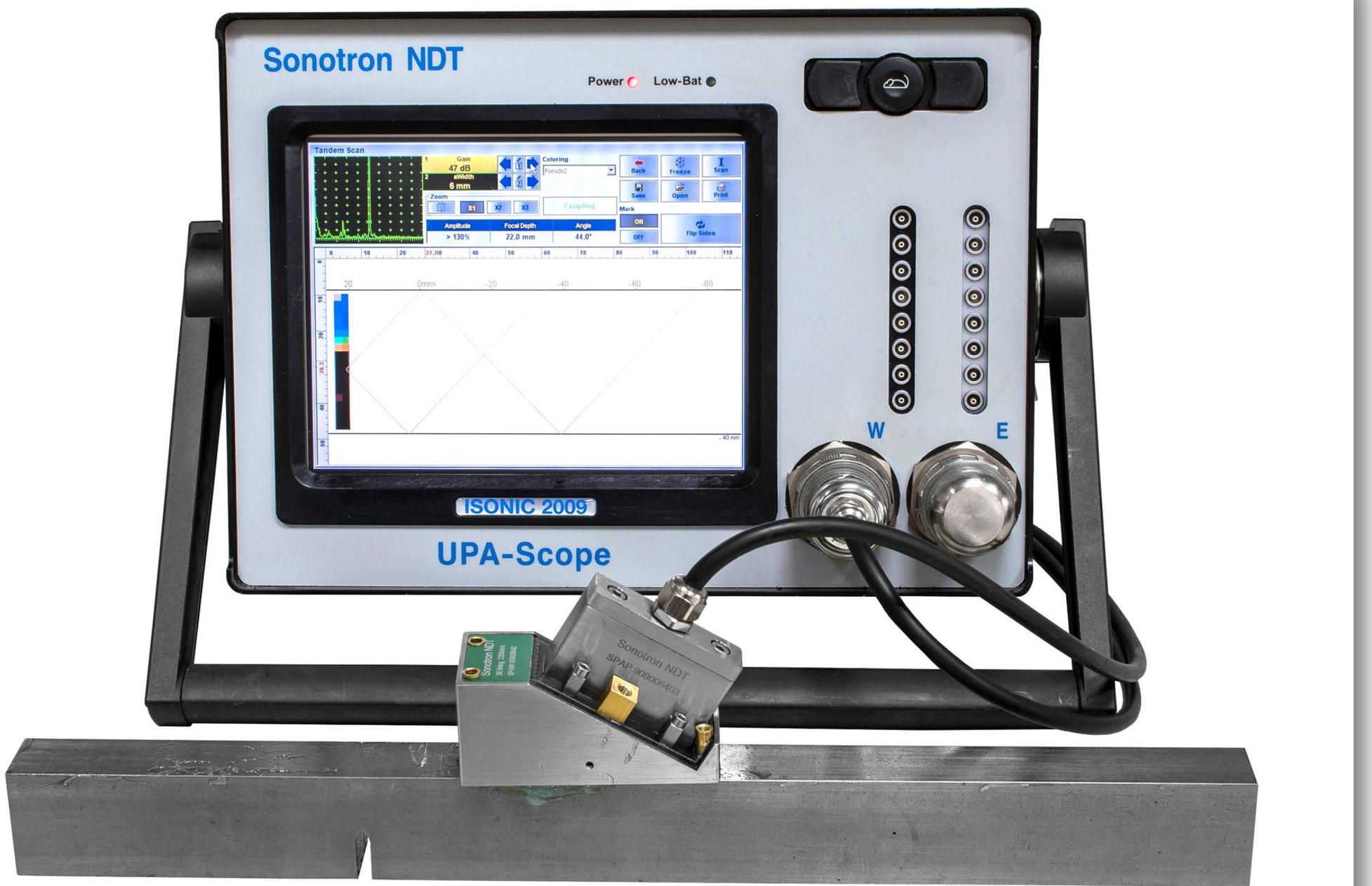
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Energy: Tandem B-Scan



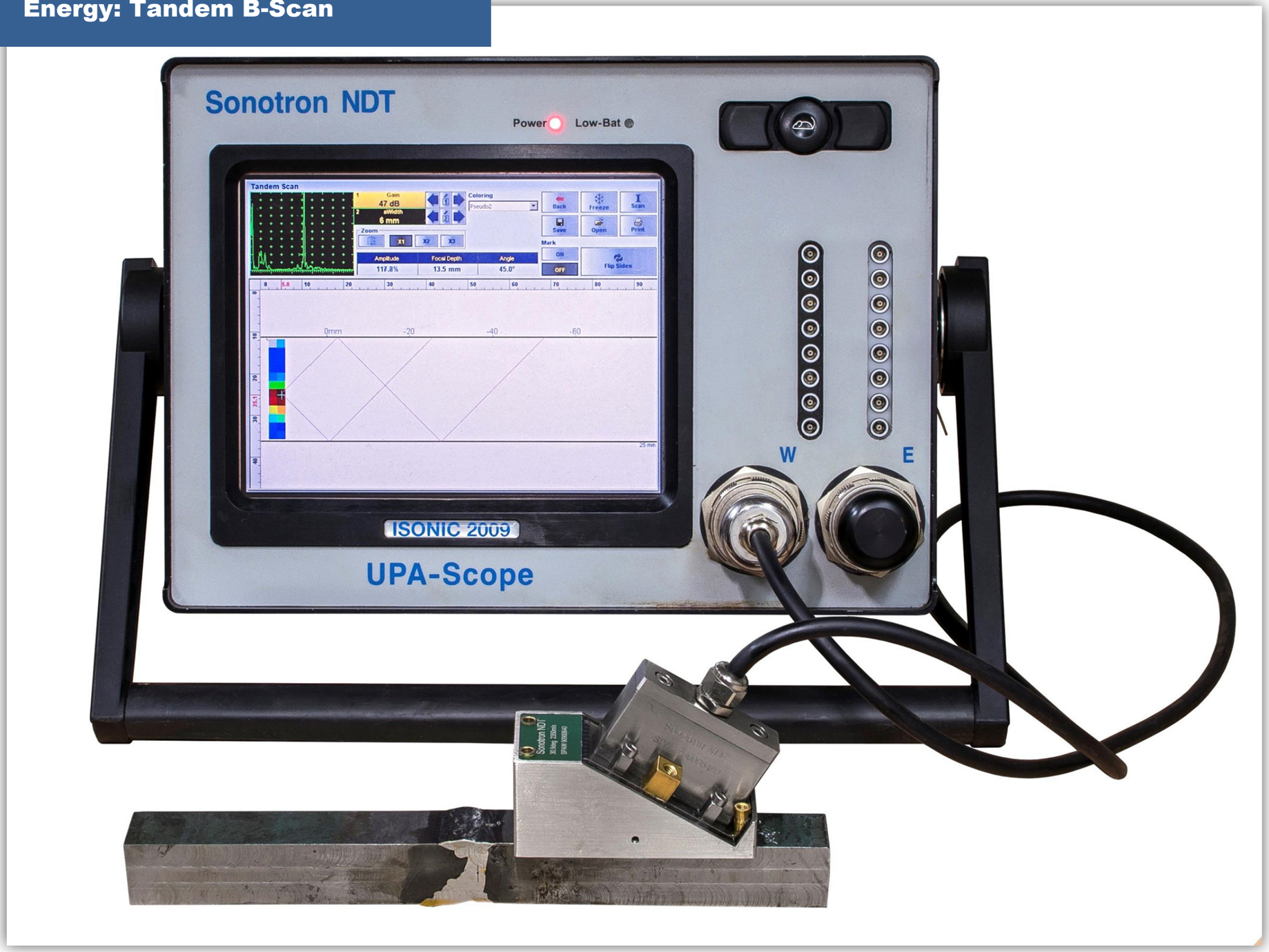
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Energy: Tandem B-Scan



the right image is worth a thousand words

ISONIC 2009 UPA Scope

Heavy Wall Stuff: Tip Diffraction B-Scan

the right image is worth a thousand words

ISONIC 2009 UPA Scope

Raw Materials: 3D-Scan L

the right image is worth a thousand words

ISONIC 2009 UPA Scope

Trucks, buggers, cranes etc

the right image is worth a thousand words

ISONIC 2009 UPA Scope

Trucks, buggers, cranes etc

the right image is worth a thousand words

ISONIC 2009 UPA Scope

Trucks, buggers, cranes etc

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Power Generation

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Railways

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Railways

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Railways

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

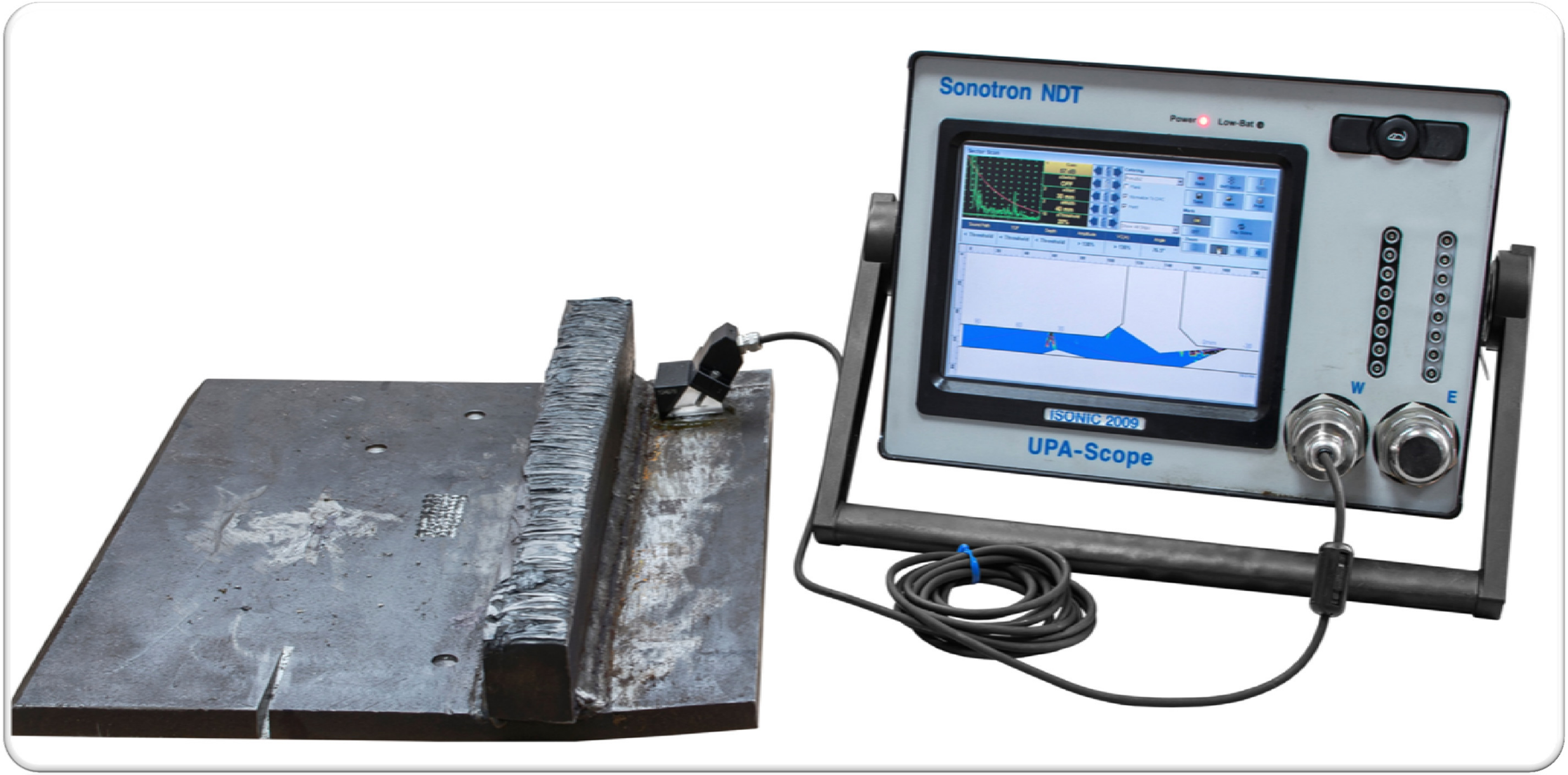
ISONIC 2009 UPA Scope

Railways

the right image is worth a thousand words

ISONIC 2009 UPA Scope

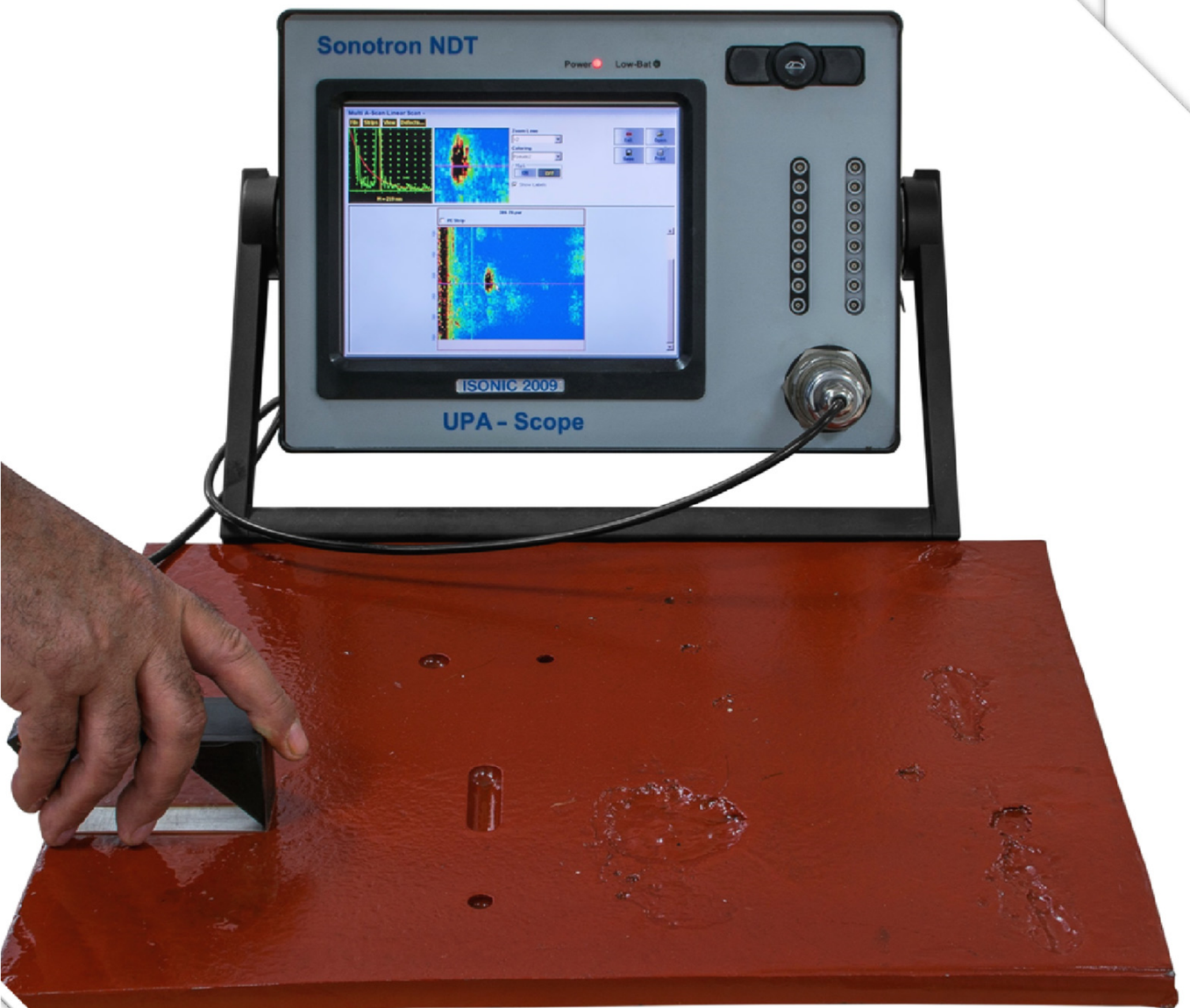
Preventive Maintenance: Annular Rings



the right image is worth a thousand words

ISONIC 2009 UPA Scope

Preventive Maintenance: SRUT - Plates



the right image is worth a thousand words

ISONIC 2009 UPA Scope

Preventive Maintenance: SRUT – Steel Poles

Detection of the corrosion in the area of
air to soil interface

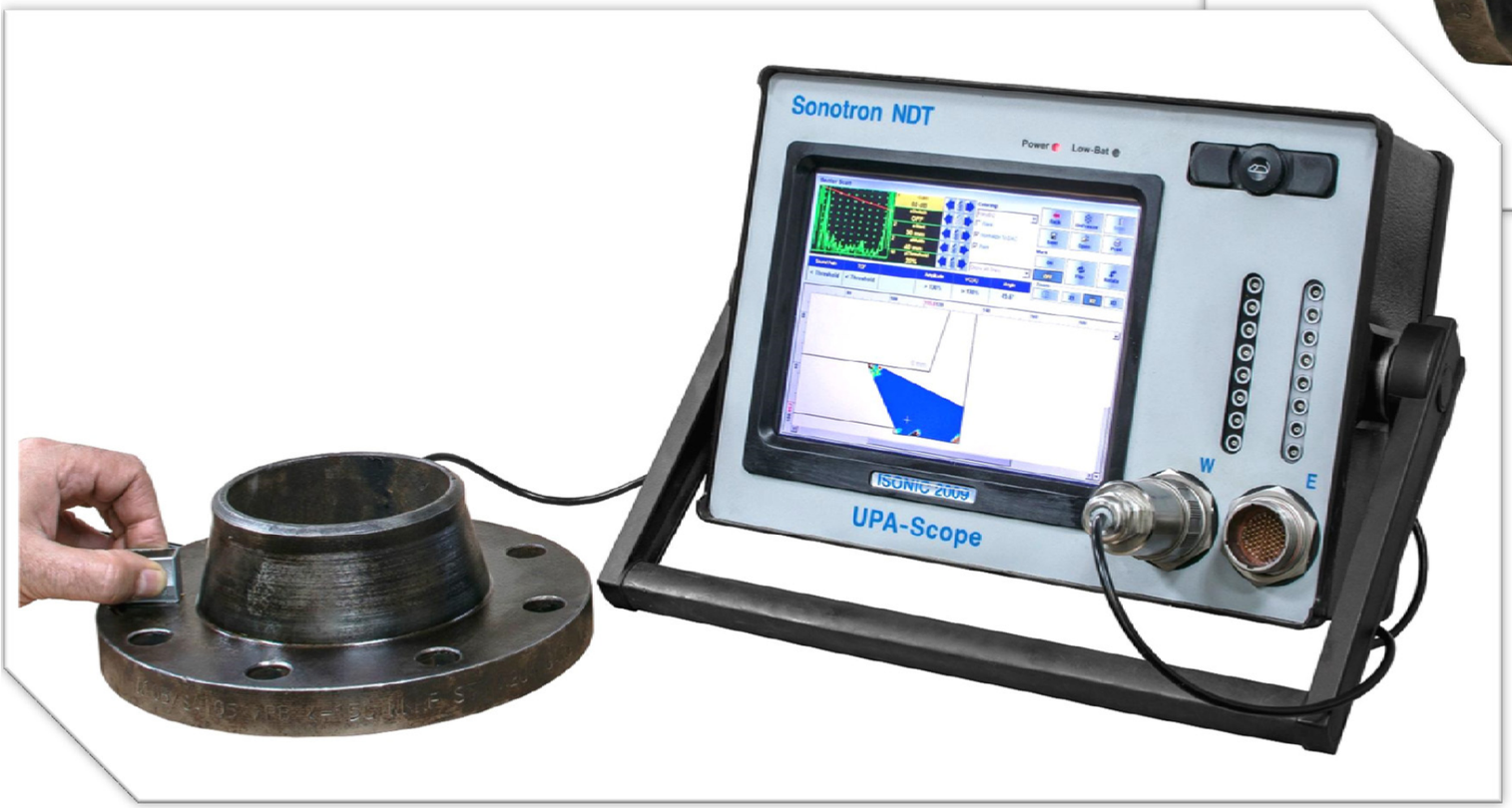
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

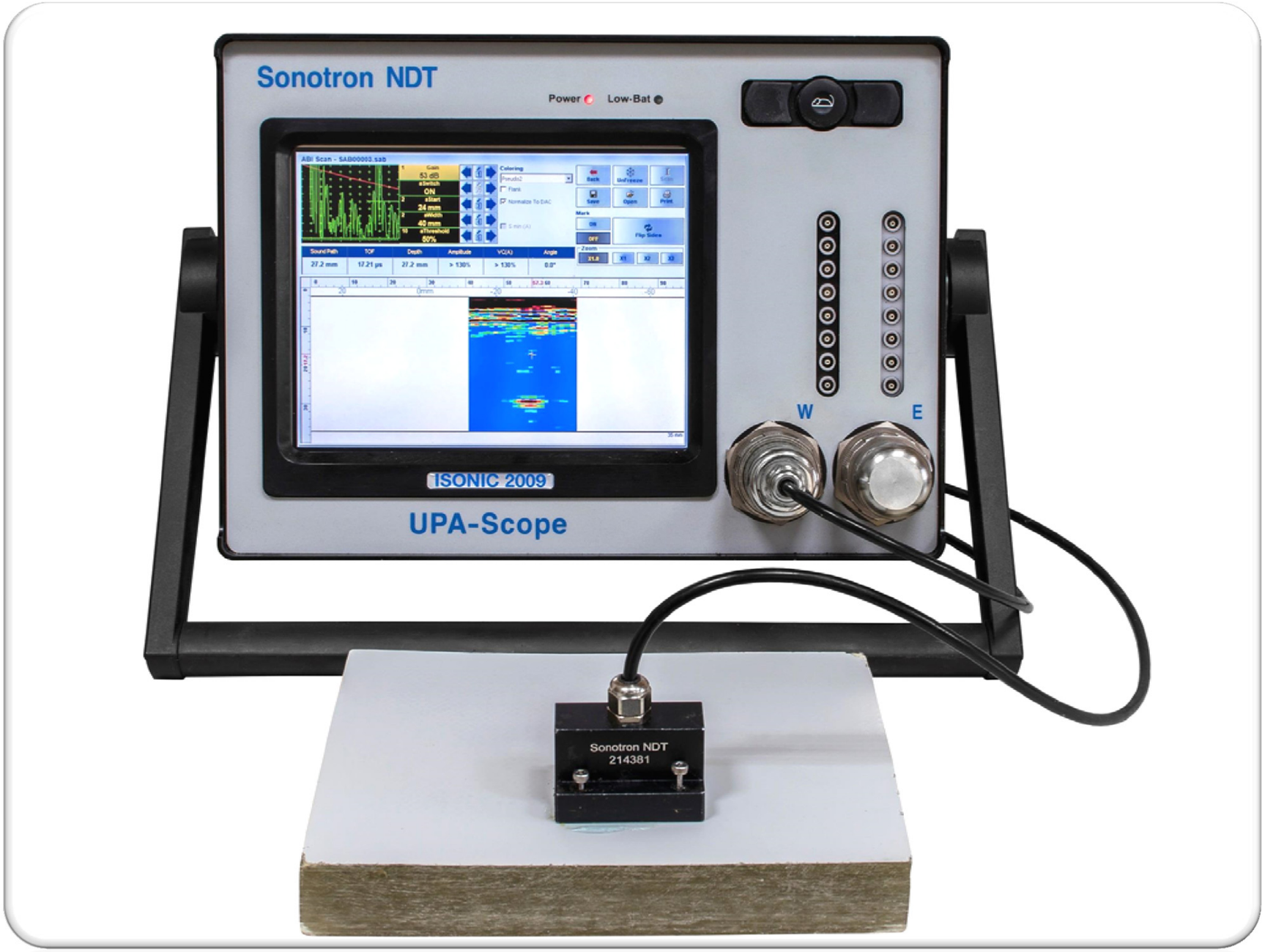
Preventive Maintenance: FFC



the right image is worth a thousand words

ISONIC 2009 UPA Scope

Wind Energy: Glass Fiber



the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Yachts, Boats, Other Ships: Glass Fiber

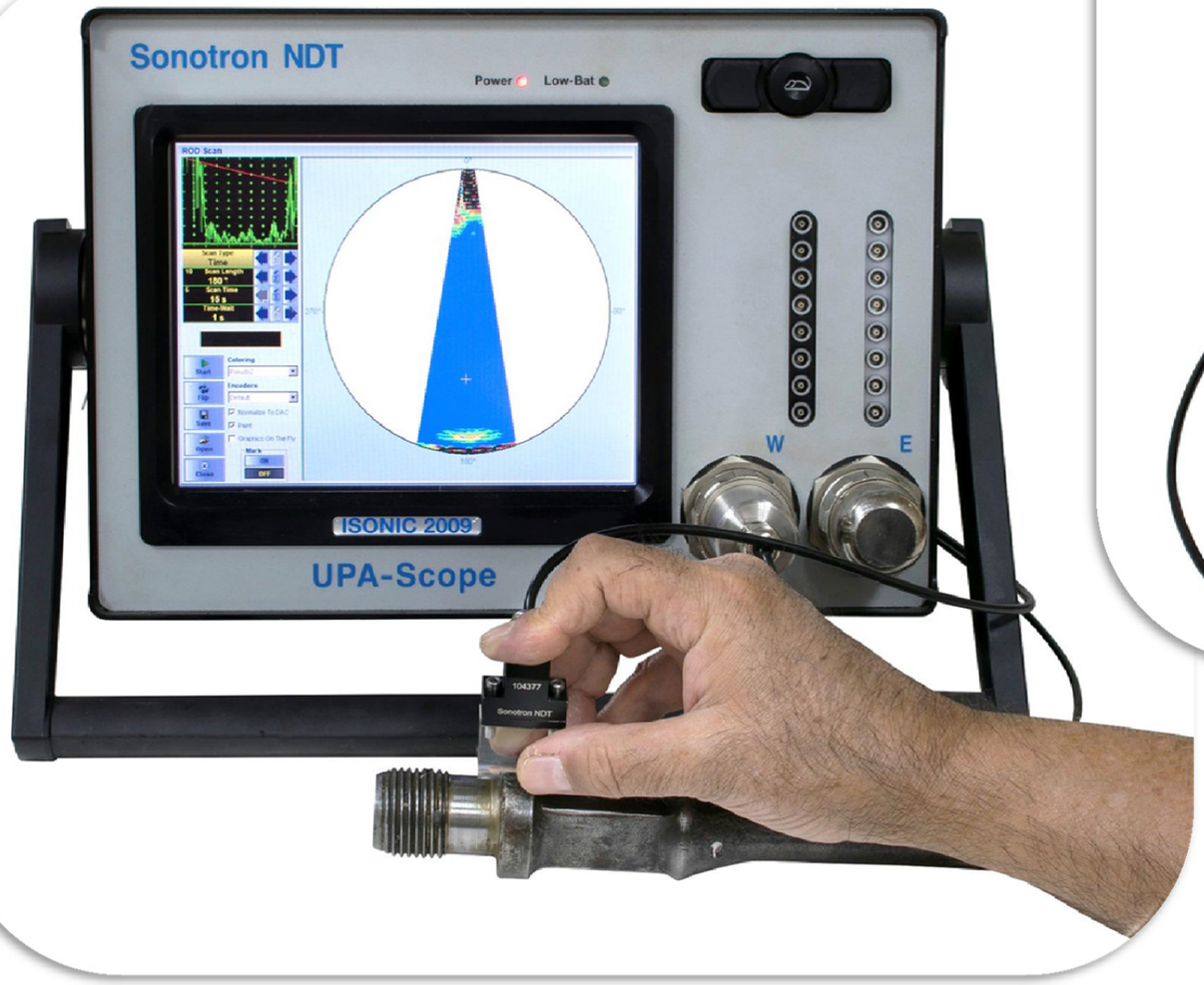
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Drilling and Exploration



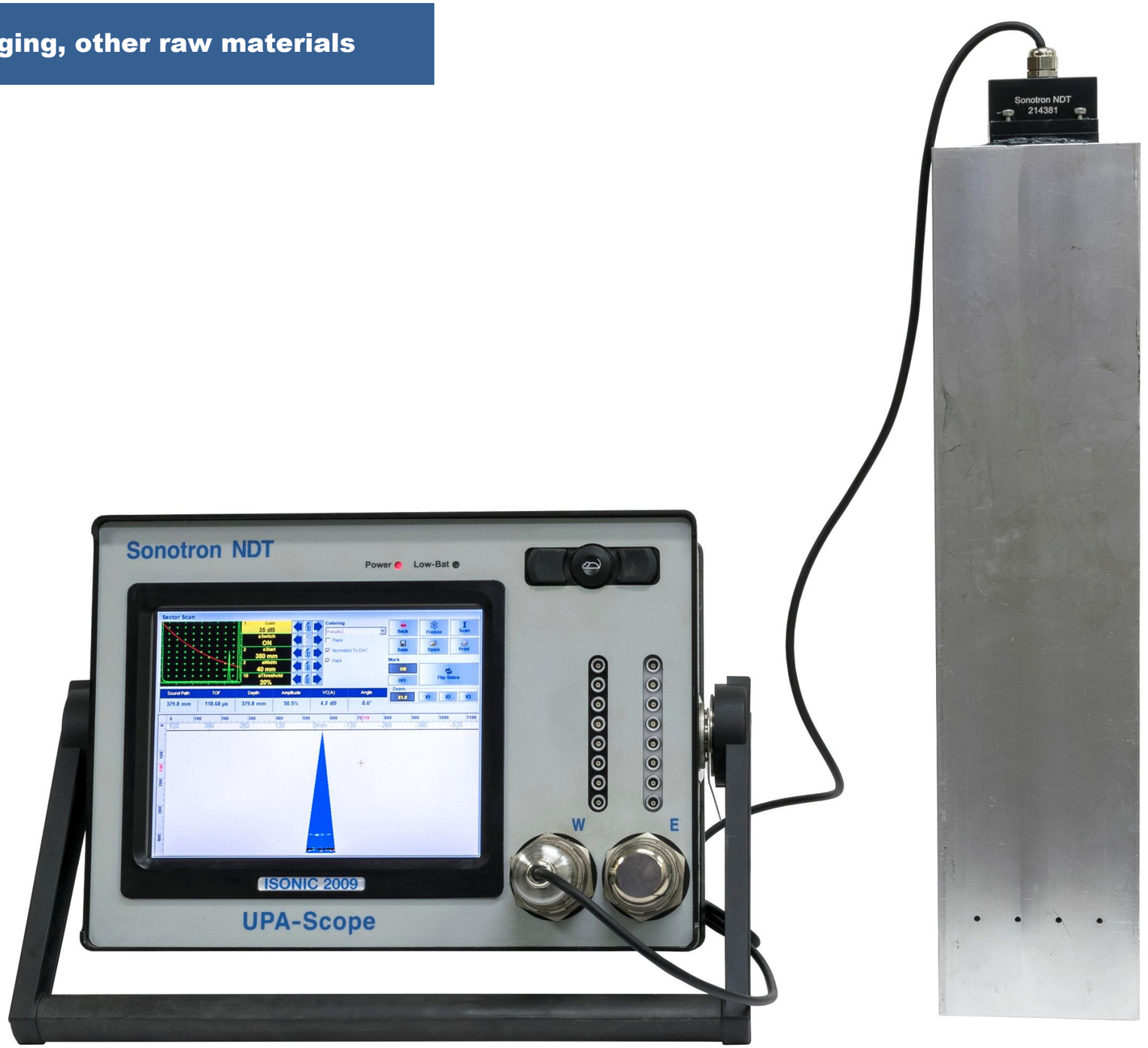
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Casting, forging, other raw materials



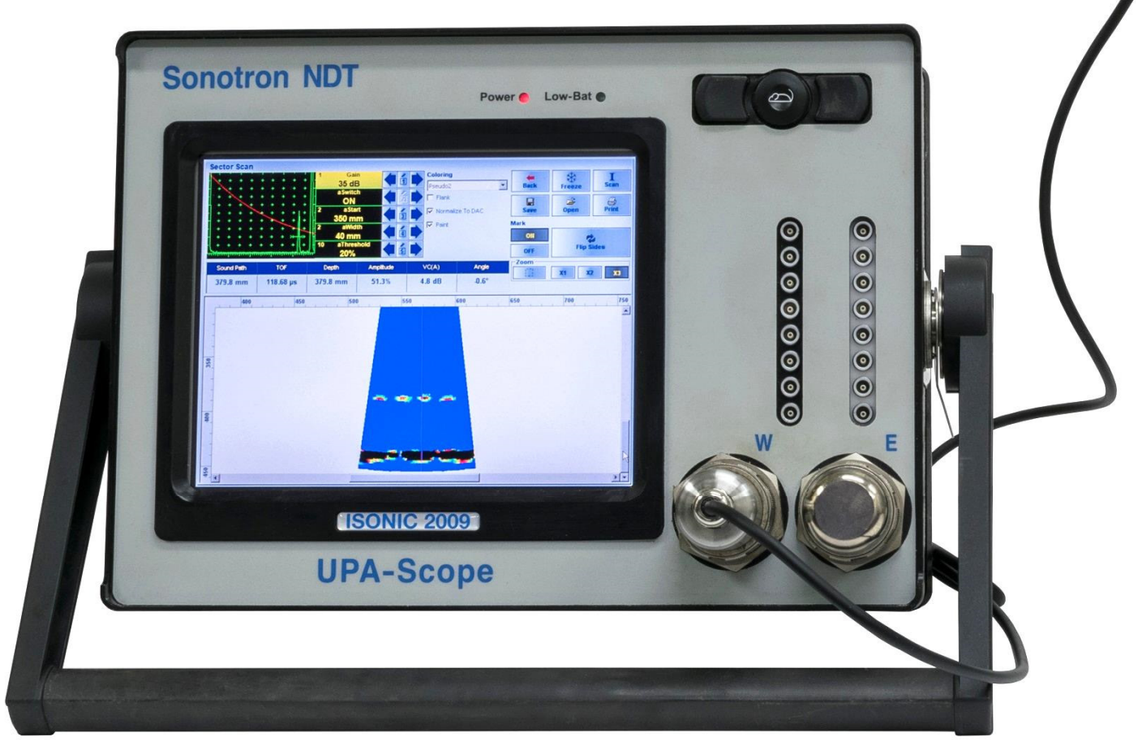
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Casting, forging, other raw materials



the right image is worth a thousand words

ISONIC 2009 UPA Scope

UT over IP

ISONIC 2009 UPA Scope may be controlled remotely from a regular computer running under Win'XP, 7, 8, 10. There is no need in the special software for that purpose, just the same software that runs in the instrument. The instrument and the PC should be connected to the LAN or to the router distributing IPs automatically. Since the connection is established **ISONIC 2009 UPA Scope** enters into the slave mode driving the probes and capturing the A-Scans, the hardware measurements, and the encoder data supplying them to the computer, which provides full control of the instrument along with data acquisition, processing, displaying and storage on the local drives

the right image is worth a thousand words

ISONIC 2009 UPA Scope

Versatile Fully Parallel PA Functionality

Use of miniature active PA functionality extenders fitted between instrument's terminals and the instrument ends of probe cables allows quick and simple adjustment of PA architecture of the same instrument for best matching with different PA probes or pairs of probes that may be required by numerous inspection procedures

Fully Parallel
2 X 32:32
2 X 64:64
1 X 128:128

Fully Parallel
1 X 64:64

Fully Parallel
2 X 32:32

the right image is worth a thousand words

SONOTRON NDT
www.sonotronndt.com

ISONIC 2009 UPA Scope

Versatile Fully Parallel PA Functionality

the right image is worth a thousand words

SONOTRON NDT

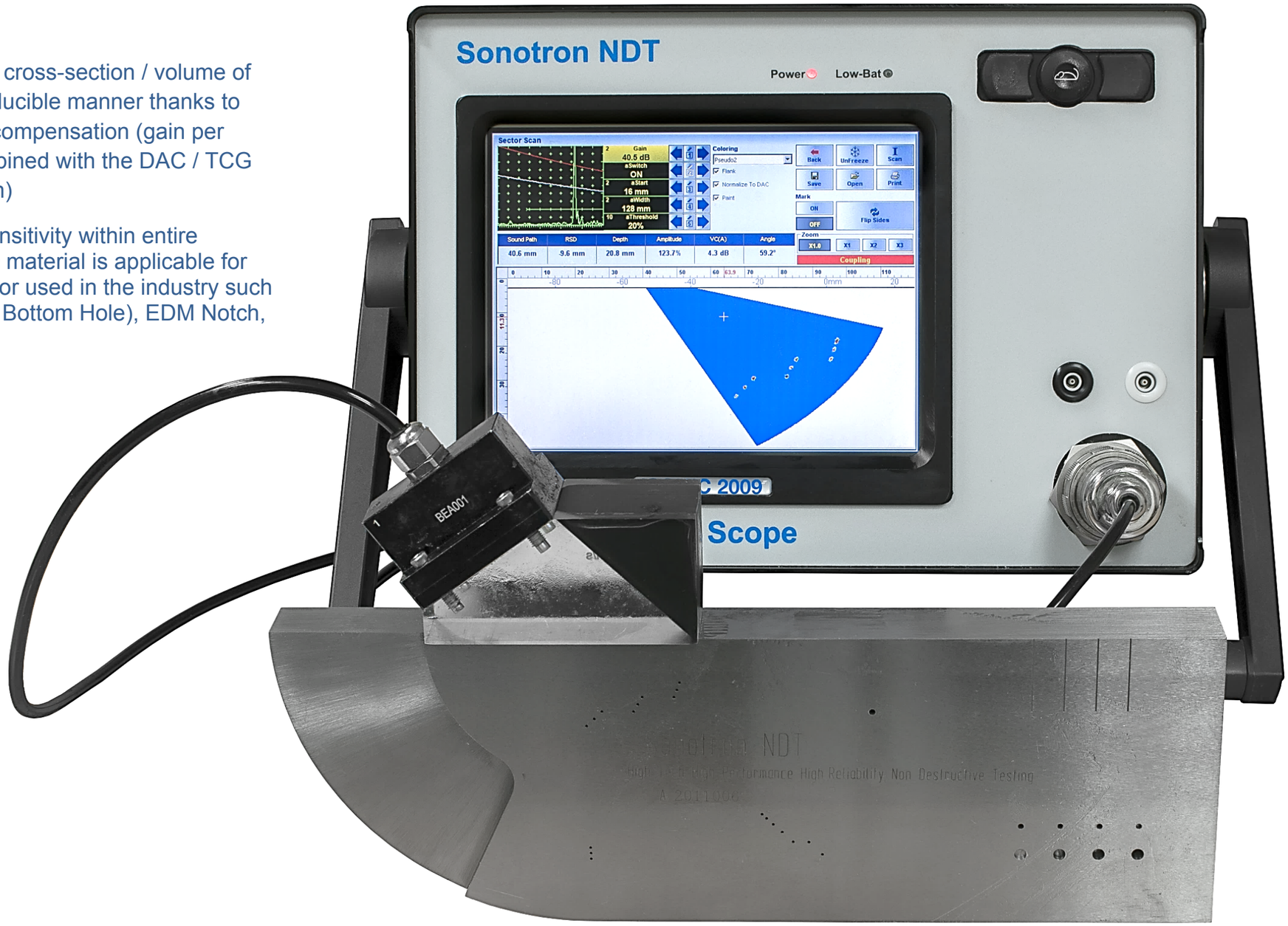
www.sonotronndt.com

ISONIC 2009 UPA Scope

EquPAS – Homogenized Coverage Sensitivity

Homogeneous sensitivity within entire cross-section / volume of the material is provided in easy reproducible manner thanks to unique TCG-independent angle gain compensation (gain per focal law compensation) solution combined with the DAC / TCG image normalization (EquPAS solution)

EquPAS solution for homogenizing sensitivity within entire covered cross-section / volume of the material is applicable for every desired type of reference reflector used in the industry such as SDH (Side Drilled Hole), FBH (Flat Bottom Hole), EDM Notch, and the like



the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Scanning Performance Strip

Along with recording and displaying of the inspection data characterizing the quality of the material the on-line monitoring of scanning performance is provided:

- perceptible operative indication is submitted through progressive filling of the *Scanning Performance Strip* with green (normal process), red (coupling loss – total data loss), and violet (over-speed – partial data loss) colors urging the operator to rescan the imperfectly passed segments
- scanning performance data is recorded synchronously with the inspection data and stored into the same file

100% raw data capturing and homogenized inspection sensitivity over entire cross-section (volume) of the material as determined by the scan plan and the scanning performance data monitored on-line and recorded at parallel with the inspection results bring the testing integrity to the highest level

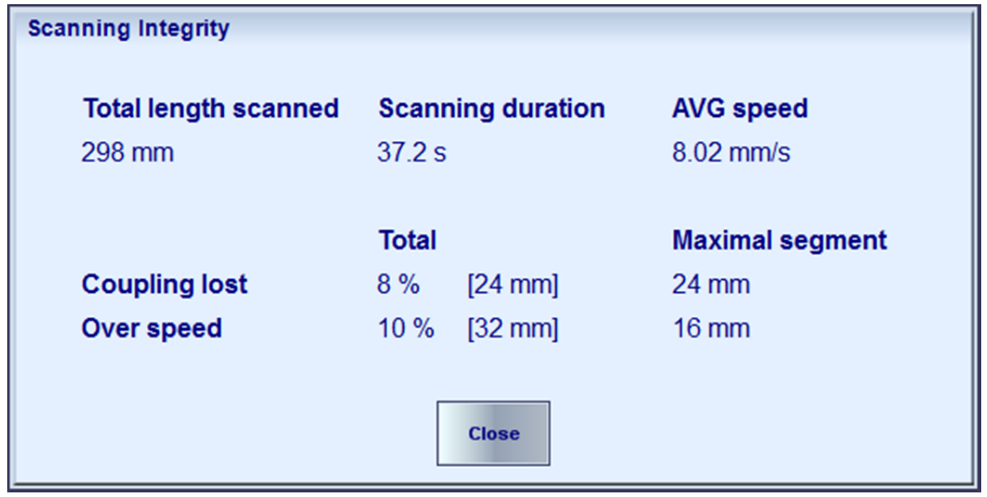
the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

Scanning Integrity Report



Quantitative Scanning Integrity Report may be generated automatically as soon as scanning completed. Alternatively thanks to 100% raw data capturing it may be formed out of the stored files at the postprocessing stage

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com

ISONIC 2009 UPA Scope

ISONIC 2009 PA UPA-Scope - Technical Data

PA Modality

Structure:	1 X 64:64 switchable* to / from 2 X 32:32 1 X 256:256 or 1 X 128:128 switchable* to / from 2 X 64:64** * - the instruments configured according to part ##s 804901, 804903 ** - with use of corresponding active PA functionality extension adapters **Important:** there is no external splitter required in case of using 2 PA probes simultaneously
Initial Pulse:	Bipolar Square Wave with Boosted Rising and Falling Edges, Guaranteed Shell Stability, and Active Damping
Transition:	≤7.5 ns (10-90% for rising edges / 90-10% for falling edges)
Amplitude:	Smoothly tunable (12 levels) 50 … 300 Vpp into 50 Ω
Half Wave Duration:	50…600 ns controllable in 5 ns step
Emitting aperture:	1...64/128* adjustable as fully or partially matching OR mismatching with the receiving aperture * - with use of the corresponding extension terminal
Receiving Aperture:	1...64/128* adjustable as fully or partially matching OR mismatching with the emitting aperture * - with use of the corresponding extension terminal
Phasing - emitting and receiving:	0…100 µs with 5 ns resolution independently controllable
Analogue Gain:	0...100 dB controllable in 0.5 dB resolution
Advanced Low Noise Design:	85 µV peak to peak input referred to 80 dB gain / 25 MHz bandwidth
Frequency Band:	0.2 … 25 MHz
A/D Conversion:	100 MHz 16 bit
Digital Filter:	32-Taps FIR band pass with controllable lower and upper frequency limits; non-linear acoustics technique supported
Superimposing of receiving aperture signals:	On-the-fly, no multiplexing involved
Phasing (receiving aperture):	On-the-fly 0…100 µs with 5 ns resolution
Dynamic Focusing:	Supported
FMC, TFM, Back Diffraction Technique with / without and Mode Conversion:	Supported
A-Scan:	• RF • Rectified (Full Wave / Negative or Positive Half Wave) • Signal's Spectrum (FFT Graph)
Reject:	0...99 % of screen height controllable in 1% resolution
Material Ultrasound Velocity:	300...20000 m/s (11.81…787.4 "/ms) controllable in 1 m/s (0.1 "/ms) resolution

ISONIC 2009 UPA Scope

Time Base - Range:	0.5...7000 µs - controllable in 0.01 µs resolution
Time Base - Display Delay:	0...400 µs - controllable in 0.01 µs resolution
Probe Delay:	Automatically settled depending on the PA probe / wedge / delay line in use according to the desired: • Aperture(s) • Incidence Angle • Focal Point Position • etc
DAC / TCG:	• One Per Focal Law • Multi-curve • Slope ≤ 46 dB/µs • Available for the rectified and RF A-Scans • Theoretical – through entering dB/mm (dB/") factor • Experimental – through recording echoes from several reflectors; capacity - up to 40 points
Automatic Gain Correction:	Complimentary Mechanism Independent on DAC / TCG: • AGC - Angle Gain Compensation for the sectorial scan coverage • GPSC - Gain Shot (Focal Law) Correction for other types of coverage
EquPAS - Equalized (Homogenized) PA Inspection Sensitivity:	Provided for every desired type of reference reflector: • SDH (Side Drilled Hole) • FBH (Flat Bottom Hole) • EDM Notch • etc
Gates:	• 2 Independent gates per focal law (**A** and **B**) with the **Start** / **Width** controllable over entire time base in 0.1 mm /// 0.001" resolution • **IE** gate per focal law for the standard *Interface Echo start* function controllable over entire time base in 0.1 mm /// 0.001" resolution
Threshold:	5…95 % of A-Scan height controllable in 1 % resolution
Phased Array Probes:	• 1D Array – linear (LA), rings (RA), daisy (DA), and the like • Dual Linear Array (DLA) • Matrix Array (MA) • Dual Matrix Array (DMA)

Focal Laws:	• 8192
	• Independently adjustable gain / time base / apertures / pulsing receiving modes, etc for each focal law among the plurality of implemented within a frame composing sequence
	• On-the-fly focal law editing ability
	• Dynamic focusing:
	  ○ for any set of points distributed within entire cross-section of the material covered by linear array probe / group of probes and forming either straight, curved, zigzag, or broken line
	  ○ for any set of points distributed inside 3D space within entire cube or other volumetric polygon of the material covered by matrix array probe / group of probes

ISONIC 2009 UPA Scope

Scanning and Imaging:	• Cross-Sectional B-Scan (E-Scan) – regular and/or Volume Overlay True-To-Geometry • Cross-Sectional Sector Scan (S-Scan) – regular and/or Volume Overlay and True-To-Geometry • Cross-Sectional Tandem B-Scan – Volume Overlay and True-To-Geometry • Tip Diffraction B-Scan for sizing of surface breaking cracks • 3D-Scan – Live 3D imaging out of matrix array probes • Multi-group image composed of several cross-sectional B- and S-Scans • Horizontal Plane S-Scan • FMC/TFM synthetic aperture images • Back-diffraction image • FD B-Scan (Frequency Domain B-Scan) • Strip Chart • TOFD Map out of a pair of PA probes • Top (C-Scan), Side, End View imaging formed through encoded / time-based line scanning, 3D-Viewer • Top (C-Scan), Side, End View imaging formed through encoded XY- scanning, 3D-Viewer • Scanning Performance Strip representing Coupling Loss and Over-Speed events • Quantitative Scanning Integrity Report
Data Storage:	100% raw data capturing
Postprocessing:	• Built-in means for the comprehensive postprocessing in the instrument • ISONIC PA Office - freely distributable postprocessing package for the computer running under W'XP, W'7, W'8, W'10

Conventional UT and TOFD

Number of Channels:	1 / 8 / 16* * - on special order
Pulsing/Receiving (multichannel operation):	• Parallel - all channels do fire, receive, digitize, and record signals simultaneously • Sequential – cycles of firing, receiving, digitizing, and recording signals by each channel are separated in time in a sequence loop
Initial Pulse:	Bipolar Square Wave with Boosted Rising and Falling Edges, Guaranteed Shell Stability, and Active Damping
Transition:	≤7.5 ns (10-90% for rising edges / 90-10% for falling edges)
Amplitude:	Smoothly tunable (12 levels) 50 … 400 Vpp into 50 Ω
Half Wave Duration:	50…600 ns controllable in 10 ns step
Modes:	Single / Dual
Analogue Gain:	0...100 dB controllable in 0.5 dB resolution
Advanced Low Noise Design:	85 µV peak to peak input referred to 80 dB gain / 25 MHz bandwidth
Frequency Band:	0.2 … 25 MHz Wide Band
A/D Conversion:	100 MHz 16 bit

ISONIC 2009 UPA Scope

Digital Filter:	32-Taps FIR band pass with controllable lower and upper frequency limits
A-Scan:	• RF • Rectified (Full Wave / Negative or Positive Half Wave) • Signal's Spectrum (FFT Graph)
Reject:	0...99 % of screen height controllable in 1% resolution
Material Ultrasound Velocity:	300...20000 m/s (11.81…787.4 "/ms) controllable in 1 m/s (0.1 "/ms) resolution
Time Base - Range:	0.5...7000 µs - controllable in 0.01 µs resolution
Time Base - Display Delay:	0...400 µs - controllable in 0.01 µs resolution
Probe Angle:	0…90° controllable in 1° resolution
Probe Delay:	0...70 µs controllable in 0.01µs resolution
DAC / TCG:	• Multi-curve • Slope ≤ 46 dB/µs • Available for the rectified and RF A-Scans • Theoretical – through entering dB/mm (dB/") factor • Experimental – through recording echoes from several reflectors; capacity - up to 40 points
DGS:	Standard Library for 18 probes / unlimitedly expandable
Gates:	2 Independent gates (**A** and **B**) with the **Start** / **Width** controllable over entire time base in 0.1 mm /// 0.001" resolution
Threshold:	5…95 % of A-Scan height controllable in 1 % resolution
HW Gates:	Standard Option
Interface Echo:	Standard Option
Digital Readout:	• 27 automatic functions • Dual Ultrasound Velocity Measurement Mode for Multi-Layer Structures • Curved Surface / Thickness / Skip correction for angle beam probes • Ultrasound velocity and Probe Delay Auto-Calibration for all types of probes
Freeze A-Scan:	• Freeze All • Freeze Peak Note: signal evaluation, manipulating Gates and Gain is possible for the frozen A-Scans as for live
Scanning and Imaging - Single Channel:	• Thickness Profile B-Scan • True-To-Geometry Angle / Skip Corrected Cross-sectional B-Scan • High Resolution B-Scan • Horizontal Plane View CB-Scan • TOFD
Scanning and Imaging - Multichannel:	• Strip Chart - strips of 4 types, namely P/E Amplitude/TOF; Map; TOFD; Coupling • Stripped C-Scan

ISONIC 2009 UPA Scope

Standard length of one line scanning record:	50…20000 mm (2"…800"), automatic scrolling
Data storage:	100% raw data capturing
Postprocessing:	• Built-in means for the comprehensive postprocessing in the instrument • ISONIC Office L - freely distributable postprocessing package for the computer running under W'XP, W'7, W'8, W'10

General

PRF:	10...5000 Hz controllable in 1 Hz resolution
On-Board Computer CPU:	• Dual Core Intel Atom N2600 CPU 1.6 GHz / units manufactured after 2017-05-31 • AMD LX 800 - 500MHz / units manufactured on or before 2017-05-31
RAM:	• 2 GB / units manufactured after 2017-05-31 • 1 GB / units manufactured on or before 2017-05-31
Quasi HDD:	• SSD Card 128 GB / units manufactured after 2017-05-31 • CF Card 4 GB / units manufactured on or before 2017-05-31
Screen:	Sun readable 8.5” touch screen 800 x 600
Controls:	• Touch screen • Top Cover Sealed Keyboard • Front Panel Sealed Mouse
Standard Ports:	• 2 x USB (optionally expandable up to 8) • Ethernet • sVGA • Wi Fi (optional – through optional external USB dongle) • 3,4,5G (optional – through optional external USB dongle)
Operating System:	• W'7PROEmb / units manufactured after 2017-05-31 • W'XPEmb / units manufactured on or before 2017-05-31
Encoder Port:	• Single Axis Incremental TTL encoder – direct connection • Multi-Axis (2, 3, 4, etc) Incremental TTL Encoder – Through Miniature Scanner Mounted Optional Multi-Axis Encoder Interface Box
USB Encoder Port:	Dual Axis Incremental TTL Encoder – Through Optional Miniature Scanner Mounted Dual Axis Encoder Interface Box
Remote Control:	• From an external computer running under W'XP, W'7, W'8, W'10 through Ethernet or Wi Fi • From 3,4,5G Cell Phone • No special software required • All calibration and inspection data is stored in the control computer
Ambient Temperature:	• -30°C ... +60°C (operation) • -50°C ... +60°C (storage)

ISONIC 2009 UPA Scope

Housing:	• Rugged aluminum case with carrying handle • IP 65 • No air intake • The cooling is not required
Dimensions:	314x224x124 mm (12.36"x8.82"x4.88") – without battery 314x224x143 mm (12.36"x8.82"x5.63") – with battery / units manufactured after 2017-05-31 314x224x152 mm (12.36"x8.82"x5.98") – with battery / units manufactured on or before 2017-05-31
Weight:	4.550 kg (10.01 lbs) – without battery 5.480 kg (12.06 lbs) – with battery

the right image is worth a thousand words

SONOTRON NDT

www.sonotronndt.com