THE MAC EDGE®

Product and Services Guide

www.mac-ndt.com
As metal manufacturers simultaneously push for the highest levels of productivity as well as the lowest costs, it becomes increasingly difficult for businesses to staff their own team of NDT experts.

Still, critical advice is needed on a regular basis. Setting standards, making informed technological decisions, determining the best instrument for a required test, and even routine maintenance demand proper attention and quick reflexes. This is exactly what the “MAC® Edge” is all about.

As soon as you begin discussions to purchase or lease our equipment, the MAC team of professionals becomes part of your team. Our Business Development Managers, who collectively bring decades of experience and technical knowledge, will help you to identify the right equipment to meet your requirements or even assist you in defining exactly what those requirements should be.

Our Field Engineers, many with ASNT Level III certifications, will guide you through preparation, installation, startup and the training of your operators. Those same experts will also be available to service your equipment if any problems should arise.

As you can probably tell, the “MAC® Edge” involves much more than technology, performance and systems. It’s made possible by the people who stand behind it, every day of the year. That’s why we’ve chosen to spotlight a few of them in this catalog.

Dudley Boden
President & CEO

For over 90 years, MAC has been a leader in nondestructive testing. Get complete details at: www.mac-ndt.com/90-years-ndt/

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Collaborative Leaps in NDT Innovation
We provide NDT solutions using the latest Ultrasonic, Eddy Current, Flux Leakage and Phased Array Ultrasonic Technology. But at MAC, the science of innovation is often driven by a specific customer challenge. To sum it up, your needs often inspire our ongoing exploration of cutting-edge systems and solutions.

The Highest Level Of Customer Support
In the farthest corners of the world, MAC Field Engineers and Representatives go beyond every expectation to serve our customers.

See their stories at: https://youtu.be/feIQkySyHg8

Refining and Improving Testing Technologies
We specialize in unique NDT solutions that can answer an existing demand, or push the envelope, and guide your business towards maximum potential.

Realistic Quotations
Our Business Development Engineers and inside Sales Team members work together to recommend a system that can meet your NDT requirements...as well as your budget.

To request a quote, call (914) 530-2000, or email us at: info@mac-ndt.com.

An ISO 9001:2015 Company
“Being part of a company with over nine decades of experience gives our team insights that customers find invaluable as they consider ever-changing testing requirements.”

Phil Meinzinger
Business Development Manager

Through 92 years of experience, MAC has acquired a wealth of specific industry knowledge to support an extensive array of systems, solutions and services. In addition, the MAC global network places a team of NDT experts, Field Engineers and seasoned Representatives right at your fingertips.

**Hot Rolled Bar**

**The Challenge** – Rough surface conditions, typical of black bar, can prevent detecting shallow surface defects.

**The MAC Edge** – The MultiMac® with rotary probes and high sensitivity, can find defects down to .2mm deep. The Rotoflux® AC extends this capability to even smaller defects, detecting longitudinal flaws down to 0.1mm in depth. If internal defects are a concern, an Echomac® Ultrasonic test can be added.

**Cold Drawn Carbon Steel Bar**

**The Challenge** – These products often need to be inspected for longitudinally oriented surface defects as well as for shorter defects.

**The MAC Edge** – MultiMac® electronics with a Rotomac® Eddy Current Rotary can detect surface defects such as seams, laps, scabs and cracks. When used with encircling coils, MultiMac® can detect shorter defects, pits and some subsurface anomalies depending on test settings and the nature of the bar. Systems can test to ASTM E2375, AMS-STD-2154 and EN 10308.
Wire, Rod and Insulated Cable

**The Challenge** – Your choice of NDT equipment will depend on the nonconforming conditions you wish to detect and the size and characteristics of the material.

**The MAC Edge** – Minimac® 50/55 Eddy Current Testers can detect welds and discontinuity in wire, rod and insulated cable. Encircling coils detect short surface and subsurface flaws such as cracks, inclusions, butt welds and other defects in steel, stainless alloy or non-ferrous wire.

More demanding applications such as testing Nitinol® wire as small as .013” diameter for use in medical applications may require the MultiMac® Eddy Current instrument. With its phase sector output gate and specialized test coils, cracks and inclusions can be reliably detected. For small diameter material such as tungsten filament wire, a high-frequency Eddy Current test is recommended to identify welds and brazes.

Round and Square Billets

**The Challenge** – These materials need to be inspected for both internal defects as well as for imperfections on their flat surfaces and corners.

**The Mac Edge** – MAC recommends a combination Eddy Current and Ultrasonic System for inspecting hot rolled square and round billets up to 9” (228.6mm) in diameter. The UT system detects internal defects, while the Eddy Current unit, using both sector coils and rotary test probes, can spot defects on the flat surface and corners.

These tests meet MIL STD 2154 standards.

Oil Country Tube and Pipe

**The Challenge** – Producers of heavy wall OCTG tube must meet the demanding specifications of API 5L & 5CT, ASTM A252, DIN, EN and other standards.

**The MAC Edge** – Echomac® Ultrasonic and RotoFlux® Flux Leakage Systems detect both transverse and longitudinal defects in material up to 500mm diameter, and also meet API standards requiring two technologies.
No two products follow the same path, yet one step remains constant: the critical need to evaluate product integrity. Whatever the challenge involves, MAC is ready to offer solutions that will meet your specific needs and requirements.

Welded and Seamless Steel Alloy Tube

The Challenges - Diameter, wall thickness, tube condition and throughput speed can all influence NDT system selection. In addition, the location where the test is being applied in the manufacturing cycle can also affect the choice of method.

The MAC Edge - In-Line Testing
A typical test for surface and subsurface defects might include the MultiMac® Eddy Current Tester with one test channel, an encircling test coil for full body defect detection, or a sector test coil for weld zone inspection. When testing welded or seamless cold-drawn tubes, the Echomac® Ultrasonic Rotary or weld zone system could be the best choice, even on small diameters.

The MAC Edge - Off-Line Testing
Using several technologies can provide more comprehensive inspection. Products from multiple lines can then be brought to one test line for final inspection.

Read more at: www.mac-ndt.com/welded-tube/
Inclusions in Non-Ferromagnetic Tube, Bar and Wire

The Challenges - Metal inclusions, such as filings from finning tools, can be as small as 3mg and are difficult to find using standard Eddy Current test coils.

The MAC Edge - A Flux Leakage Magnetic Inclusion Detector (MID), consisting of MultiMac® electronics with a special coil sensor to provide a DC field, can be used to detect ferrous inclusions. In addition, MAC’s Production Comparator PC-VI with null test coils detects small ferromagnetic inclusions and stringers in non-magnetic stainless steel rods and bars and can also inspect most austenitic grade products.

Read more at:
www.mac-ndt.com/finned-copper-tube/

Petrochemical and Nuclear

The Challenges - Inspecting to the demands of these industries, as well as meeting ASTM, ASME and customer-specific testing requirements.

The MAC Edge - An Echomac® Ultrasonic test system can be combined with a MultiMac® Eddy Current encircling coil or Rotomac® Rotary Probe equipment to provide the advantages of several technologies in one multi-test system. The versatile Echomac® electronics can be used with a variety of transducer configurations including an immersion tank installation, where it is successfully testing titanium tube for nuclear applications. The Echomac® Model 6A also holds GE Qualification for P3TF31 and P29TF82 Class A and B, typically required for nuclear applications. Multi-channel Eddy Current units can be customized to monitor material grade, or to inspect for sigma phase in duplex materials.
Heat Exchanger Tube

The Challenge – Tubes made of carbon steel, stainless steel, titanium alloys, copper alloys, copper and aluminum require NDT solutions that can allow testing to meet a customer’s quality standards, as well as meeting requirements of ASTM, ISO, EN and other national standards bodies.

The MAC Edge – Echomac® UT Rotary Systems can cover a large OD range of longitudinally welded or seamless precision-drawn tubes. At high throughput rates, untested ends can be limited to less than 50mm depending upon diameters and conditions.

Our systems feature Echomac® FD-6/6A electronics with up to 32 channels and full network support for remote viewing and control.

Automotive Tube and Bar

The Challenge – Eddy Current and Ultrasonic systems must be configured to meet the unique demands of the specialized tubes used by the automotive industry. Solid bar purchased by automotive parts fabricators needs to exhibit very high internal and surface quality. In addition, 100% volumetric inspection is now a requirement for many uses.

The MAC Edge – MAC offers simple Eddy Current test units as well as complex multi-method test systems. MAC can also supply full Ultrasonic volumetric capability and added AC Flux Leakage or Eddy Current systems for surface inspection. Testing speeds to 2 meters per second are standard.

MAC Offers a Multi-Test System for Automotive Tubing. Find out more at: www.mac-ndt.com/multi-test-system-for-tubing/

Rotoflux® Flux Leakage System to test automotive bar.

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Medical

The Challenge – Materials used for the medical industry often have very small diameters or exceedingly thin walls that are difficult to test.

The MAC Edge – High-frequency Eddy Current coils can inspect small diameter materials such as tungsten, titanium and nickel alloys that are used for applications such as guide wires and stents. MAC’s new Echomac® 25mm UT Rotary provides optimum results in testing high precision small diameter thin wall tubular product and bar for medical applications. The Varimac® Comparator can sort out defective medical needles, surgical blades and more.

Composites

The Challenge – Composites are made from two or more constituent materials with significantly different physical properties.

The MAC Edge – The Echomac® Phased Array Composite Tester features mechanics such as immersion systems and bubblers that are designed according to customer requirements and part geometries. The platform can be scaled accordingly, and additional channels can be added to support application requirements.

Read more at:
www.mac-ndt.com/echomac-pa-composite/
APPLICATIONS

Rapid inspection of fasteners and metal parts for properties such as heat treatment, hardness and alloy is a key requirement in meeting tight specifications for automotive, nuclear and other industries. Improperly heat-treated parts, for example, can result in costly machining issues, reworking, lost production time and product failure. Comparators can provide a fast, reliable method of inspection.

Which Method Is Right For You?
All parts may be submitted for a free evaluation and analysis by MAC’s experienced engineers to determine the best NDT solution for your application.

Log on to: www.mac-ndt.com/parts/

Production Comparator
Detects variations in carbon steel parts.

- Low-frequency comparator tests for case depth, core hardness, grade and structure.
- Highly sensitive circuits can detect changes in test signal phase, amplitude or harmonic distortion.
- Optional software allows for simultaneous analysis of eight frequencies to meet complex test standards.

Custom Systems
Testing special parts and conditions.
Combinations of Eddy Current, Ultrasonic and/or Flux Leakage technologies can also be specially designed to meet your inspection needs.

Varimac® Comparator
Sorts for variations in alloy, dimension and cracks.

- Tests bearings, fasteners and other cold-formed parts.
- Inspects ferrous (magnetic) or nonferrous (non-magnetic) parts.

Shown is a connecting rod bolt, typical of parts that can be tested for hardness using a low-frequency electromagnetic comparator such as the Production Comparator VI.

Typical fastener parts that can be inspected for hardness, alloy, various dimensions and other physical characteristics using Eddy Current or electromagnetic comparators.

Valve train assembly showing pins (B) that can be tested prior to assembly by a Varimac® for proper heat treatment. The rocker arm (A) can be inspected with the Production Comparator to detect gas pockets that result from the casting process.

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APPLICATIONS

Your testing process – whether it involves meeting the most exacting customer requirements or testing to your own internal standards – presents unique challenges. That’s why a MAC custom solution might be the right choice for you.

**Designed to be an Integral Part of Your Production Line**

Multicollector software is available to bring together results from multiple testers, including, in some cases, existing test operations in your mill. Listed are three custom applications:

- An Eddy Current test instrument can handle a variety of applications. For example, copper water tubing is often tested for surface cracks, pinholes and other defects using a one- or two-channel MultiMac® tester. A coil platform, to hold and position the test coils, completes the system.

- A Flux Leakage test can be used to find defects in automotive tube with wall thickness variations, or for basic OCTG testing to comply with API 5L. A single longitudinal flux leakage test head will meet the requirements for detecting longitudinal defects.

- A Multi-Test System combines one or more Eddy Current, Ultrasonic or Flux Leakage testers with sophisticated electronic controls and precise mechanical components. These controls can handle and position your material and sensors so you achieve optimum performance and speed on even the most difficult test applications.

MAC Offers a Multi-Test System including the 500mm UT Rotary with 500mm Transverse and Longitudinal Rotoflux® Flux Leakage testers. Find out more at: www.mac-ndt.com/echomac-500mm-tester/

“We supply custom solutions where test specifications dictate a UT transducer configuration and an optimized transducer set. This can make the difference between success and failure.”

Joe Baldauff
Vice President, Technology

A multi-test system for inspecting OCTG heavy-wall large-diameter pipe combines Ultrasonic and Flux Leakage technologies.

Visit www.mac-ndt.com
ULTRASONIC TESTING

MAC's state-of-the-art, high-speed Ultrasonic systems enable a full volumetric examination of materials.

MAC’s Proprietary Echomac® FD-6/6A Electronics

Sophisticated UT inspection for on- or off-line flaw detection, thickness, weld inspection and dimensional measurement.

- High signal to noise ratio, precise thickness resolution (1µm), and excellent repeatability and reliability.
- A wide range of applications: from full body testing for spinning tube and weld zone inspection, to 500mm Ultrasonic/Flux Leakage multi-test systems.
- Single-screen control of key parameters can be controlled on a single screen.
- Meets high level quality standards for nuclear, aerospace and other critical applications.
- Compatible with rotary, immersion, squirter, bubbler and “spin the tube” applications.

Download the brochure at:
www.mac-ndt.com/echomac-fd6-multichannel-ut/

Echomac® SM

Convenient, compact UT inspection to cover a wide range of applications.

- Features up to 8 channels of instrumentation (non-rotary applications).
- Detects and evaluates thickness, flaws and eccentricity.
- Displays Strip Chart with recording, live A-Scan during test.
- Measures dimensions using MAC's optional Dimensional package.
- Can connect to external monitor, mouse and keyboard if needed.

Download the brochure at:
www.mac-ndt.com/echomac-fd6-multichannel-ut/

Echomac® Velocity Measurement

Assesses nodularity in ductile iron cast automotive components.

- Evaluates velocity, thickness or flaw detection.
- Operates with either full immersion or bubbler couplant technology.
- Enables the testing of two parts simultaneously—from separate test stations—using only one instrument.

More details at:
www.mac-ndt.com/echomac-vm-velocity-measurement/

12 Email Us info@mac-ndt.com  B Bar  R Rod  T Tube  P Parts  W Wire
MAC’s Echomac® Ultrasonic Rotaries provide high speed testing of round bar and tubular products ranging from 5mm to 500mm diameter. Product test applications include everything from small diameter thin wall product for critical applications to heavy wall pipe for OCTG. Used with the Echomac® FD series of instruments, these systems provide optimum results.

Multi-test system with 125mm UT and 550 EC Rotary on a V roll bench to test bar.

Echomac® UT 25mm Rotary

A superior choice to inspect high-precision small diameter tube and bar for flaw and dimensional defects.

- Designed to provide 100% test coverage of 5 to 25mm product at high throughput rates.
- Tests wall thickness as thin as 0.3mm.
- Local remote pulser/receiver allows high gain, but provides low susceptibility to mill electrical interference.
- Offers precise thickness resolution (<1μm) and excellent repeatability and reliability.
- Use with MAC’s Echomac® FD-6/6A instrument for optimum performance.
- 630mm length allows for ease of installation in existing inspection lines.
- Unique water flow control loop ensures the correct volume of water flow for coupling.

Water Packages for UT Systems

MAC offers Water Packages to provide a couplant of clean, tempered water. The modular design includes a filtering unit, cooling system, water reservoir and delivery/return pumps. System is PLC controlled and housed in a cabinet. Custom options are available.

Echomac® UT 25mm Rotary with Absolute Water Flow Meter to ensure constant correct water flow.

For more details visit: www.mac-ndt.com/25mm-ut-rotary/
Echomac® Full Body and Tube End Tester Systems

UT test for spinning tube.

- APC (Adaptive Pitch Control) transducer carrier adjusts to the actual pitch as the tube is rotated during the test.
- Works with a simple immersion water tray to follow even unstraight tube and reliably maintain constant coupling.
- Tests a broad range of sizes from 2”-14” (50mm-355mm) in diameter.
- Premium grade conveyor accurately maintains the inspection helix and rotational speed to achieve optimum performance.
- Can also be installed to upgrade your existing test line.

For more details, visit:
www.mac-ndt.com/echomac-full-body-tester/

Echomac® WLD Ultrasonic Weld Line Test System

A system designed to test for longitudinally oriented defects that are typical of the ERW welding process.

- Features operating conveniences for inspecting tube weld zones on-line during continuous production.
- System typically has four channels, using both CW and CCW sound modes. Additional channels can be added.
- Detects ID and OD longitudinal defects between 5% and 10% of wall thickness.
- Test head includes quick disconnect feature that exchanges irrigated transducer shoes in 5 seconds for tube size changes.

Find out more at:
www.mac-ndt.com/weld-line-test/
**Echomac® PA BT for Bar**

Handles a large range of diameters in a single installation.

- 100% inspection of round bars for core and surface defects at speeds up to 2m/sec, depending on specific application.
- Three models cover a total range of 10mm-254mm capacity.
- UT transducer cassettes can be switched for different sizes in under 5 minutes.
- Probe alignment can be optimized by using convenient positioning knob on the cassette.
- Floating head adapts for small variations in bar straightness.
- No additional manual operations required after initial setups are stored.
- Electronically steered transducer beam requires no operator adjustment.
- Operator-friendly graphic interface.

For more details, visit:  
www.mac-ndt.com/echomac-pa-bar-tester/

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**New Robotic Echomac® PA TW**

An operator-friendly system for detecting weld zone defects in tube and pipe caused by scarf or the welding process.

- Use one array to sequentially monitor scarf, evaluate laminar defects, or detect longitudinal OD/ID defects.
- Features B-scan and C-scan views that result in a real time image of the weld profile and defects.
- Weld profile quickly alerts operator to any issues with the scarfing process.
- Transducer settings are electronically controlled.
- No manual changes needed after initial setups.
- Easy test shoe release enables quick replacement with a test shoe for a new size.
- Intuitive pushbutton HMI control of the Robot manipulates the test head.
- Robot’s concentric position remains constant with respect to the tube and requires no adjustment when changing test shoes.
- TW System uses signals from the mill PLC to quickly retract the test head, which prevents damage when a cut-out or open seam is detected.

For more details, visit:  
www.mac-ndt.com/echomac-pa-tw-tester/
Echomac® PA Ultrasonic System

Cabinet with Door Mounted 19” Screen & Touch Screen Interface. Windows® (64 bits edition), Quad-core i7, 2.5 GHz processor, 8 GB RAM, high-speed (1 Gb/s) Ethernet link, or higher configuration.

- Phased array channels 32:128 PR.
- PA firing modes up to 32 consecutive elements.
- Encoder 2 axes (quadrature, clock direction).
- Pulse amplitude PA (at 50Ω) 35 V to 100 V.
- Maximum number of focal laws 1,024.
- Gain setting range PA 100 dB.
- Measurement gates 4 gates + 1 synchronization gate.
- For use with linear scanners, bubblers and immersion tanks.

Find out more at:

Echomac® Phased Array Wheel Tester

Robust system for in-service rail wheel tread inspection.

- Two solutions for rail wheel testing are offered.
- Semi-automated version uses a local immersion technique for tread inspection.
- Automated immersion tank option inspects tread and wheel face of rail wheels using two Phased Array probes.
- Features a 128-element probe and local immersion coupling.
- Handles wheel diameters 650-1350mm.
- Compatible with European or U.S. wheel geometries.

Find out more at:
www.mac-ndt.com/echomac-pa-wheel-tester/

Echomac® Phased Array Composite Parts Tester

Inspects a wide range of part geometries.

- Features a scalable system that offers the flexibility of adding channels as needed.
- Mechanics can be designed to meet customer requirements, ranging from incline bubbler systems to stand-alone immersion tanks with part placement.
- Meets or exceeds U.S., European and other international specifications for aerospace and automotive industries.

Find out more at:
www.mac-ndt.com/echomac-pa-composite/
MAC’s Rotoflux® technology incorporates wireless signal transfer features that minimize noise while maximizing sensitivity.

**Rotoflux® AC Flux Leakage Tester**  
*The best technology to detect surface defects in hot rolled black steel bar.*

- Tests 15mm to 180mm diameter hot rolled black bar.
- Clear defect signals with minimum noise.
- Detects longitudinal flaws down to 0.1mm in depth.
- Two surface ride probe arrays, consisting of 8 elements each, cover up to 160mm per rotation.
- Rotary uses wireless data transfer to avoid potential signal transfer noise.
- Operates up to 1500 rpm, depending on product diameter.
- Throughput speed of up to 4m/s (800 FPM) with larger diameters requiring slower FPM.
- Shares common graphic user interface with other MAC systems such as UT and EC testers.

For more information, visit:  
www.mac-ndt.com/ac_flux-leakage/

**Rotoflux® DC Flux Leakage System**

*The best technology to detect defects in heavy wall magnetic tubular products.*

- Test for OD and ID surface defects and internal flaws in (OCTG) oil country tubular goods.
- Detect longitudinal and transverse defects as small as 5% on the OD and ID, depending on material type and conditions.
- Rotary uses wireless data transfer to avoid potential signal transfer noise.
- Complete signal transfer allows individual probe signal adjustment for accurate defect location and marking.
- Retractable probe assemblies handle upset and irregular ends.
- Models available for 30mm to 500mm diameter product.

For more information about Flux Leakage Rotaries and Rotoflux® electronics, visit:  
www.mac-ndt.com/magnetic-flux-leakage/
MAC’s Eddy Current inspection systems incorporate computer-based test instruments and test coils that use two ECT coil technologies: Encircling and Sector Coils, and Spinning or Rotary Probe Coils.

**MultiMac®**

Simultaneous coil and/or rotary probe testing.

- Up to 8 test channels to use in any combination.
- For use with encircling/sector coils or rotary test probes to detect transverse, short and/or longitudinal, seam-type surface defects.
- Can operate on a wide variety of non-magnetic products or use direct current saturation to inspect magnetic material.
- Broad test frequency selection from 1KHz to 5MHz.

Find out more at: [www.mac-ndt.com/multimac/](http://www.mac-ndt.com/multimac/)

**MultiMac® SM**

MultiMac® testing technology in a smaller cabinet.

- Up to two independent test channels.
- Housed in a 20x12x12” cabinet (509mm x 304.8mm x 304.8mm) with a built-in 15” screen.


“From solutions to service, to maintenance and training, our focus is always on our customer. MAC’s highly qualified and experienced international field engineering group is the team that makes this level of support possible.”

Andrew Dodd
Director European Operations
**EDDY CURRENT TESTING**

**Rotomac® Rotary Test Probe Technology**

Recognized as the method of choice for detecting seam-type defects.

- Identifies long, continuous surface flaws that might not be detected by encircling test coils.
- Features continuously variable high-speed rotaries with up to six test probes.
- Operates with MultiMac® Eddy Current electronics.
- Tested product moves longitudinally through rotary probes, resulting in a helical search pattern.
- Capable of testing magnetic and non-magnetic material from 1/8” to 7.0” diameter (3mm-180mm).

**20mm Rotomac® HS Rotary**

*High-speed EC testing for longitudinal defects in small diameter products.*

- Detects surface flaws such as seams and laps in products ranging from 2 to 20mm (0.0787"-0.7874").
- Tests A-286 wire and similar low conductivity alloys.
- Easy-to-set-up Distance Compensation (a critical factor in testing ovate wire).
- Operates at speeds up to 18,000 RPM.
- Two spinning test probes adjust simultaneously with convenient dial-in diameter guide.
- Adapts drawing nibs as bushings to test marginally straightened wire.
- Use for continuous wire operations such as drawing, spring-making, parts forming and shape and cut.

**Visit** www.mac-ndt.com/20mm-rotomac-hs-rotary/
High-Performance Minimac® Compacts

Your choice of two affordable, single-channel Eddy Current testing options.

• Both models detect short surface and some subsurface defects, including laps, slivers and cracks in tube, bar and wire.
• High-speed continuous operation and reliability in production environments.

Minimac® 50
For simple inspection of continuous product.

• An excellent choice for dedicated, continuous production testing of wire, cable and tube where simple setup without the need for constant operator adjustment is desired.

Minimac® 55
Tests continuous product or cut lengths.

• Use optional end sensor, encoder and auto speed shift control to suppress end signals, and adjust filters for optimum line speed.
• Full strip chart recording capabilities.
**Eddy Current Testing**

Varimac® VI

High-speed Eddy Current Comparator sorts parts and detects variations.

- Provides fast, convenient sorting of metal parts such as fasteners, bearings and other cold-formed pieces.
- Can also be used for checking alloy and hardness in bar or wire or to detect variations in alloy, hardness, some dimensions, and certain types of cracks in metal bar, tube or parts.
- High-speed continuous operation and reliability in production environments.
- When used with MAC’s Parts Gates, sorts and counts at speeds up to six parts per second, into three separate groups.

**Production Comparator**

Low-frequency tester for ferromagnetic materials.

- Detects variations in alloy, heat treatment or case depth.
- Allows for rapid NDT sorting of ferromagnetic parts.
- Choice of Polar (Vector) or Lissajou screen displays.
- Optional 8-channel multi-frequency software.
- Can be set up and monitored on-site, or through a computer network.

Find out more at:  
www.mac-ndt.com/production-comparator/

Find out more at:  
www.mac-ndt.com/varimac_eddy_current_comparator/
MAC’s full range of handling components helps to ensure that NDT inspection systems reach their fullest potential.

**Standard and Custom-Designed Options**

- Components and systems are available to precisely hold and position test instruments, test coils, rotary and drives.
- Conductor controls allow complete command of test benches, multiple test instruments and pinches.
- Extensive input/output configurations can be handled by programmable logic controllers (PLC).

**“V” Roll Test Bench**

- Our standard test bench utilizes 120° “V” rolls and pinch stands to accurately support and position test material.
- “V” rolls feature three points of contact and a flat top roll to ensure firm support and eliminate vibrations.
- Automated or manual controls are offered for making easy adjustments in testing material size and diameter.

**Triple Guide Roll Constant Center Test Bench**

- Eliminates vibrations that can cause false reject signals.
- Convenient, automatic conductor controls adjust bench height and openings to accommodate changes in material dimensions.
- Recommended for testing upset pipe and tubes with badly formed ends, or in difficult straightening applications.

Find out more at: [www.mac-ndt.com/material-handling-equipment/](http://www.mac-ndt.com/material-handling-equipment/)

*Email Us* info@mac-ndt.com
SUPPORT & SERVICES

MAC Lease Options

- We offer short- and long-term operating leases on most standard test systems.
- Installation assistance, training and field staff service is provided as part of the lease.
- Service contracts or pay-per-visit arrangements also available for purchased systems.

Get more details at: www.mac-ndt.com/leasing/

ISO 17025 Accredited Test Facility

- Our Boardman, Ohio U.S.A. facility handles small jobs that might not require investing in a system.
- Can test and return-ship your product within 48 hours if necessary.
- Gives you access to encircling coil, rotary probe Eddy Current, high-speed Rotary Ultrasonic and other testing methods.
- Meets industry specifications, including ASTM E-213, ASTM E-243 and MIL STD 2154.
- Call (330) 758-1367 for information.

Find out more at: www.mac-ndt.com/test-facility/

Upgrade Existing ROWA or BIS UT Phased Array Installations with ZMS from MAC

Customers with ROWA or BIS installations can now obtain fast, reliable, price-competitive replacements and upgrades of obsolete electronics and array transducers, all from MAC.

Using state-of-the-art array transducers from SNI (Sensor Networks Inc.), Quartz Z PAUT instruments from Zetec, and MAC’s application-specific graphical user interface, the ZMS program can improve test performance and bring existing test systems up to the latest standards. As the single-point supplier for the ZMS program, MAC handles the sales, provides the system integration and after-sales service.

Get more details at: www.mac-ndt.com/zms/

“MAC is a single resource for equipment, field service and training. This has proven to be an important asset to our customers, especially for those who lease.”

Michael Rakos
District Manager

Expert Support and Training

- MAC’s global network of engineers, district managers, business development managers and representatives are always available to answer questions and address your concerns.
- These team members, trained per ASNT requirements, can provide calibrations, maintenance, upgrades, repairs, installations and staff training.

For NDT training information, visit: www.mac-ndt.com/ndt-training/

Remote Pre-Acceptance

- View and approve full operation of your new system without leaving your office.
- Eliminates scheduling challenges and reduces travel expenses.

View the video at: https://youtu.be/VVi_Nievu4g
Instruments, systems and solutions for nondestructive testing.