

ISO 9001 : 2008 Certified

# Test With The Best



## Product and Services Guide



# The New



*This brochure ushers in a renewed sense of commitment and achievement here at Magnetic Analysis Corporation. It's an energy surge that's grounded by nearly nine decades of leadership...along with being recognized as the premier supplier of instruments, systems and solutions for nondestructive testing.*

*Even though industrial manufacturing processes have changed and new standards have been introduced since our company was founded, one thing has remained constant: our focus on 100% customer satisfaction. With the capability of locally supplying routine maintenance as well as repairs, MAC has the unique ability to provide quality service anywhere in the world.*

*If you're looking for a competitive quotation for sale or lease with servicing options, don't hesitate to contact us. Our team of multi-talented experts is as ready to push the envelope, as they are to guide your business towards maximum potential. In short, whether your application requires an Eddy Current tester or a custom, multi-test system, we'll be working to prove to you that even the seemingly impossible can now be made possible.*

A handwritten signature in blue ink that reads "Dudley M. Boden".

Dudley Boden  
President & CEO

## Application Key


**B** Bar

**R** Rod

**T** Tube

**P** Parts

**W** Wire

 **MAC has been a leader in non-destructive testing since 1928. Read about the milestones in our company's history at [www.mac-ndt.com/introduction-to-mac](http://www.mac-ndt.com/introduction-to-mac).**

# Dynamics

## **Collaborative Leaps In Technology**

At MAC, the science of innovation is often driven by a specific customer challenge. Your needs often inspire our ongoing exploration of cutting-edge technologies, systems and solutions.

## **The Highest Level Of Customer Support**

In the farthest corners of the world, MAC Engineers and Representatives go beyond every expectation to serve our customers.

▶ See their stories at [www.mac-ndt.com/videos/customer-support](http://www.mac-ndt.com/videos/customer-support)

## **Remote Pre-Acceptance**

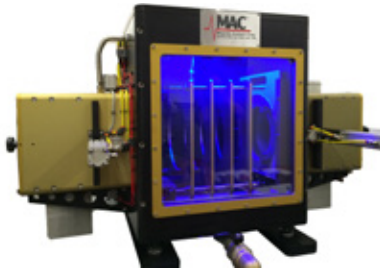
Eliminates the need to travel to our facilities. Now, you can view and approve full operation of your new system from your plant or office.

▶ See a video of remote pre-acceptance in action at [www.mac-ndt.com/videos/preacceptance](http://www.mac-ndt.com/videos/preacceptance)

## **Fast, Competitive Quotations**

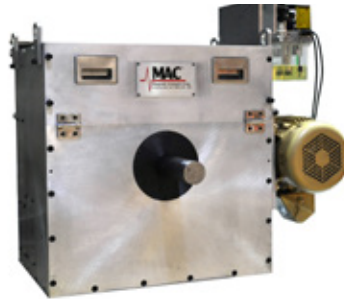
Our goal is to give you the information and advice you need as quickly as possible. Email us at [info@mac-ndt.com](mailto:info@mac-ndt.com) or call (914) 530-2000.

## Recent Breakthroughs



### **Echomac® Phased Array Test System**

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



### **Rotoflux® AC Flux Leakage Tester**

▶ See it in action at [www.mac-ndt.com/videos/rotofluxac](http://www.mac-ndt.com/videos/rotofluxac)



### **20mm Rotomac® HS Rotary**

🌐 Find out more at [www.mac-ndt.com/brochures/rotomachs.pdf](http://www.mac-ndt.com/brochures/rotomachs.pdf)



### **UT Test for Spinning Tube**

🌐 Visit [www.mac-ndt.com/brochures/echomacfullbodytester.pdf](http://www.mac-ndt.com/brochures/echomacfullbodytester.pdf)

Visit [www.mac-ndt.com](http://www.mac-ndt.com) 3



## Applications: Industry Standards

*With more than 85 years of experience, MAC has acquired a wealth of specific industry knowledge to support our extensive array of systems, solutions and services. In addition, the MAC global network places a team of industry experts, highly trained engineers and seasoned field representatives right at your fingertips.*

## Oil Country Tube and Pipe

**The Challenges** – 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, and also meet API standards requiring two technologies.



UT rotary and eddy current testing systems for seamless stainless steel tube and welded titanium tube.



### Heat Exchanger Tube

**The Challenges** – Tubes made of chrome steel, austenite, titanium alloys, copper and other materials require NDT solutions that can inspect to ASTM E213 & EN 10893-10 standards, as well as others.

**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 50mm depending upon diameters and conditions.

Our systems feature Echomac® FD-5 electronics with up to 32 channels and full network support for remote viewing and control.

### Petrochemical and Nuclear

**The Challenges** – Inspecting according to high-level requirements, such as ASTM A923 and other standards, is a common demand for both of these industries.

**The MAC Edge** – An Echomac® Ultrasonic Rotary can be combined with either a MultiMac® Eddy Current Encircling Coil or a Rotomac® Rotary Probe Multi-Test System, depending upon the material to be inspected. Multi-channel eddy current units can also be customized to inspect for several levels of sigma phase.

### Medical

**The Challenges** – Materials produced for the medical industry are usually non-ferrous and have a low permeability that is 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. In addition, the Varimac® Comparator can sort out defective medical needles, surgical blades and more.

### Automotive Tube

**The Challenges** – Eddy current and ultrasonic systems must be capable of inspecting various automotive tubes according to ASTM E570 & EN 61000 standards.

**The MAC Edge** – MAC's Longitudinal Rotoflux® inspects ERW welded, normalized, cold-worked and straightened carbon steel tubes used for automotive suspension structures and cross members with geometrical variances in wall thickness. Flaws that can be identified include weld defects, internal and external cracks, slivers, incomplete welds and weld porosity.



## Applications: Product Testing

*No two products follow the same path, yet one step remains constant: the critical need to evaluate product integrity. But whatever the challenge involves, MAC is ready to offer solutions that will meet your product's unique needs and specific requirements.*

### Welded and Seamless Steel Alloy Tube

**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 may be the best choice, even on smaller diameters.

**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/applications/inspecting-welded-tube](http://www.mac-ndt.com/applications/inspecting-welded-tube)

### Inclusions in Tube, Bar and Wire

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. 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.

Both tube and bar inclusion detection systems can test to ASTM E309, EN 10246-3, and DIN 17679 standards.

🌐 Read more at: [www.mac-ndt.com/applications/inspectingfinnedcoppertube](http://www.mac-ndt.com/applications/inspectingfinnedcoppertube)

Round billet inspection system with MultiMac® Eddy Current and Echomac® ultrasonic equipment.



6 Call (914) 530-2000

## Applications: Product Testing

### Carbon Steel Bars



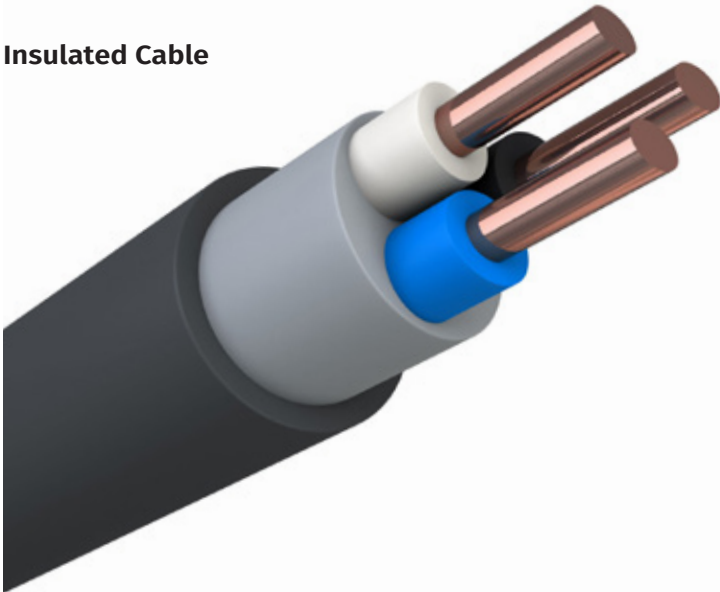
### Cold Drawn Carbon Steel Bars

MultiMac® electronics with a Rotomac® Eddy Current Rotary System detect longitudinally oriented 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 nature of the bar. Systems can test to ASTM-A564 standards.

### Hot Rolled Bar

The MultiMac®, with rotary probes and high sensitivity, can find defects down to .2mm deep. The new Rotoflux® AC extends this capability to even smaller defects, and to black bar with surface conditions that often prevent detection of shallow defects.

### Insulated Cable



When internal defects are a concern, an Echomac® Ultrasonic test can be added.

### Wire, Rod and Insulated Cable

The Minimac® MAC 50/55 Eddy Current Testers 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 may require the MultiMac® AC or the MultiMac® SM. For small diameter material such as tungsten filament wire, a high-frequency eddy current test is recommended to identify welds and brazes.

### Round Billet



### Round and Square Billets

MAC recommends a combination of eddy current and ultrasonic systems for inspecting hot rolled square and round billets up to 9" (228.6mm) in diameter. The 36-channel UT system detects internal defects, and the 8-channel eddy current test uses both sector and rotary test probes to spot defects on the flat surfaces and corners. These tests meet MIL STD 2154 standards.



## Applications: Testing Parts

*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 certified engineers to determine the best NDT solution for your application.

🌐 For more details, download our Testing Parts Brochure at: [www.mac-ndt.com/bulletins/parts.pdf](http://www.mac-ndt.com/bulletins/parts.pdf)



MAC designs and implements Varimac® systems for testing parts such as hardened steel washers.

### 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.

### Production Comparator

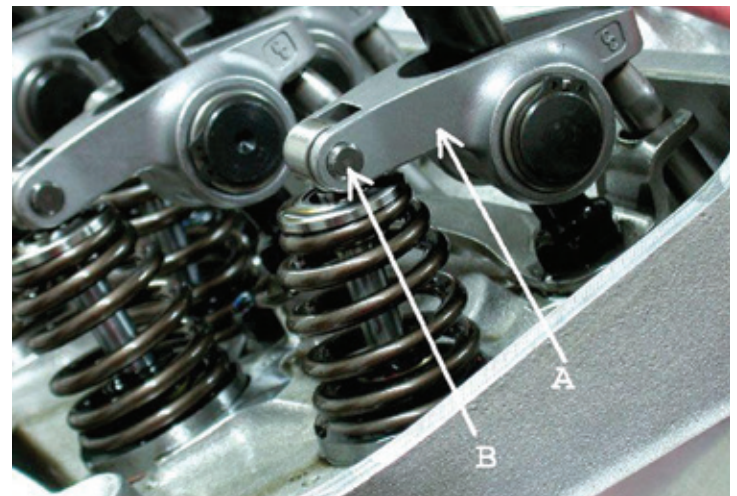
*Detects variations in carbon steel parts.*

- 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.



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.



## Applications: Custom Systems

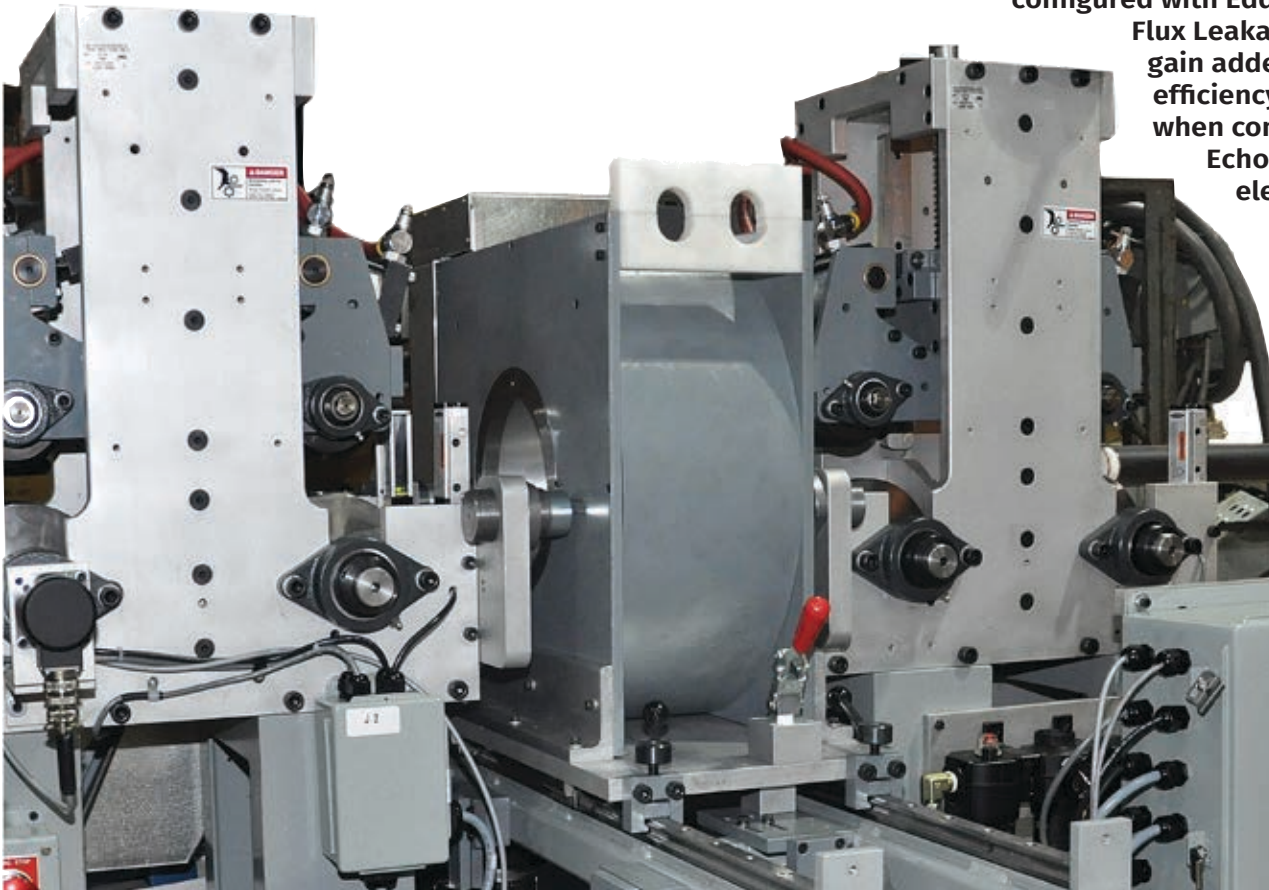
*Your testing process – whether it involves meeting the most exacting customer requirements or testing to your own internal standards – presents unique challenges. That’s why a MAC custom solution might be the right choice for you.*

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

Multicollector software is available to bring together results from multiple testers, even 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 coil will complete the system.
- A Flux Leakage test can be used to spot defects in automotive tube with wall thickness variations, or for basic OCTG testing such as 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.

**Customized applications, configured with Eddy Current or Flux Leakage equipment, gain added boosts of efficiency and accuracy when combined with Echomac® FD-5 electronics.**



## MAC's Proprietary Echomac® FD-5 Electronics

*Critical software for controlling transducers and receiving, adjusting, analyzing and reporting UT results.*

- Can be configured with up to 32 simultaneously synchronized channels.
- Evaluates and identifies ID/OD, internal flaws, lamination and wall thickness measurements.
- Operates with longitudinal or shear waves.
- User-configured flaw detection or thickness gauging for each channel.
- Displays setup parameters and simultaneous A-scan and strip chart for all channels.
- Can be used with rotary, immersion, squirter, bubbler or other types of UT systems.

🌐 For more details about Echomac® FD-5 technology, visit: [www.mac-ndt.com/technologies/ultrasonic](http://www.mac-ndt.com/technologies/ultrasonic)

**B T**



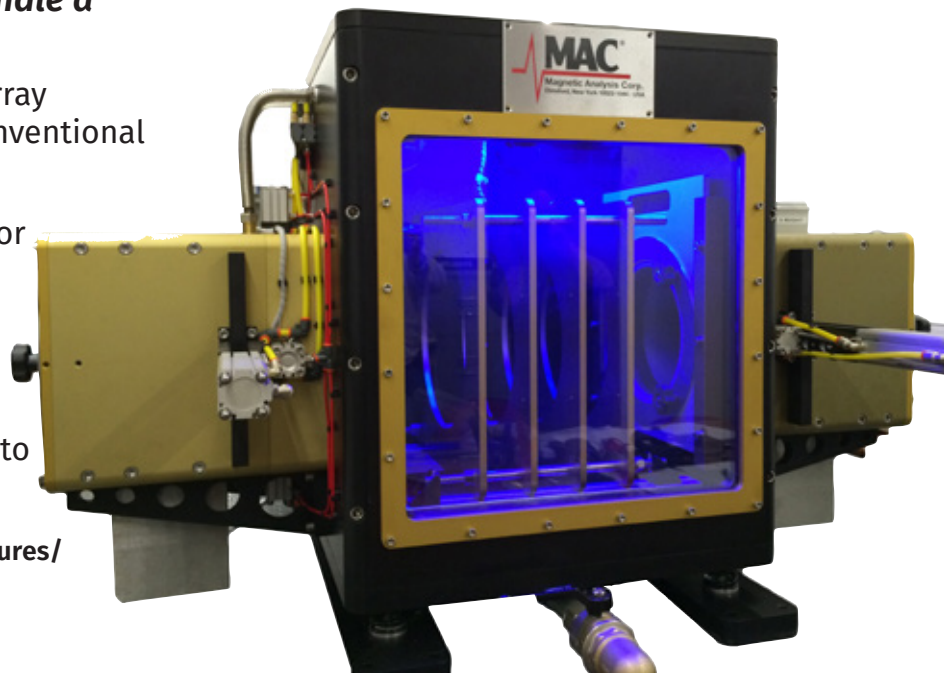
## NEW Echomac® 180mm Phased Array Test System

*High-speed parallel processing to handle a large amount of data.*

- Designed for situations where phased array ultrasonic technology is preferred to conventional rotary ultrasonics.
- Convenient cassettes hold transducers for different size ranges and allow for fast changeover times.
- Unique water box design minimizes water loss and bubbles while ensuring that bars are properly centered relative to the transducers.

🌐 See more details at [www.mac-ndt.com/brochures/echomac180mmpa.pdf](http://www.mac-ndt.com/brochures/echomac180mmpa.pdf)

**B**



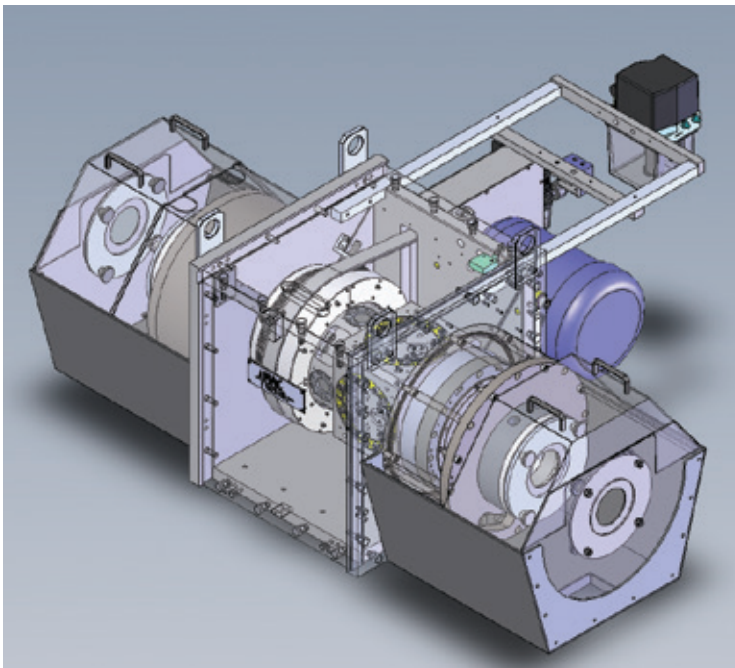
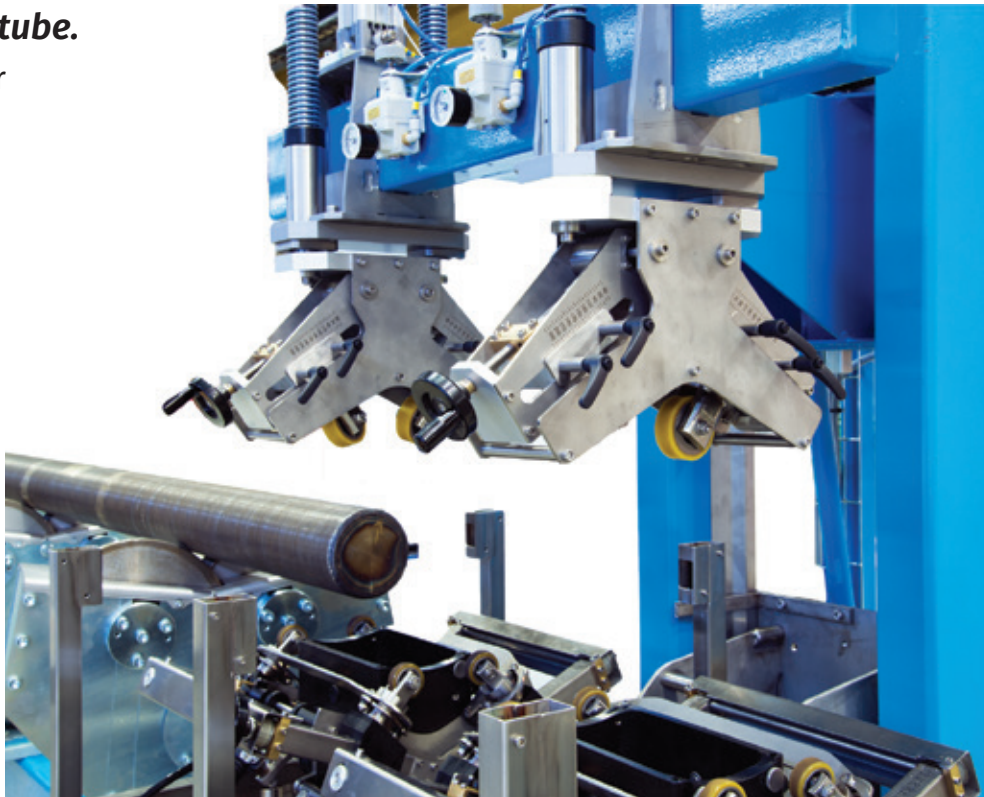


## Echomac<sup>®</sup> FD-5 Full Body and Tube End Tester Systems

*A sophisticated 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.
- Easy, one-knob adjustment controls and convenient diameter scale.
- Can be installed into your existing test line, whether the system is brand new or an upgrade.

For more details, visit: [www.mac-ndt.com/brochures/echomacfullbodytester.pdf](http://www.mac-ndt.com/brochures/echomacfullbodytester.pdf)



## Echomac<sup>®</sup> UT Rotary

*High-speed shear wave, compression wave and dimensional measurement testing.*

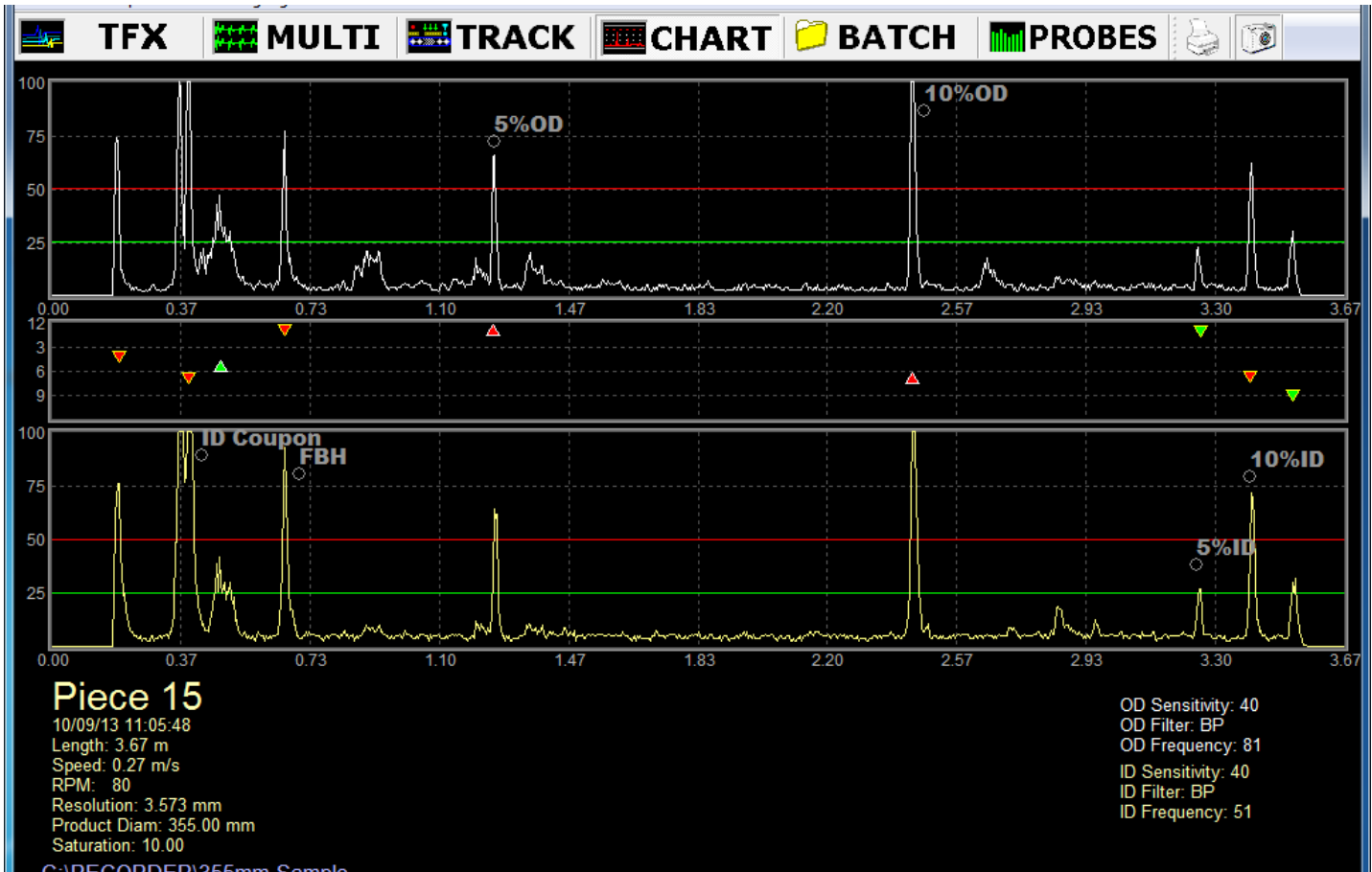
- Models are available to inspect material diameters from 10mm to 360mm at test speeds up to 200 f.p.m.
- Multiplex transducer design allows for lower noise signals and up to 48 transducer elements.
- Can be combined with eddy current instrumentation to meet API, ASTM, Mill and customer specifications.

For more details, visit: [www.mac-ndt.com/technologies/ultrasonic](http://www.mac-ndt.com/technologies/ultrasonic)





*Magnetic flux leakage test systems accurately detect defects in heavy-wall magnetic tubing, including oil country tubular goods (OCTG), bars and parts.*



Transverse Rotoflux® on-screen display of OD and ID defects.

## MAC's Rotoflux® Multiplex Electronics

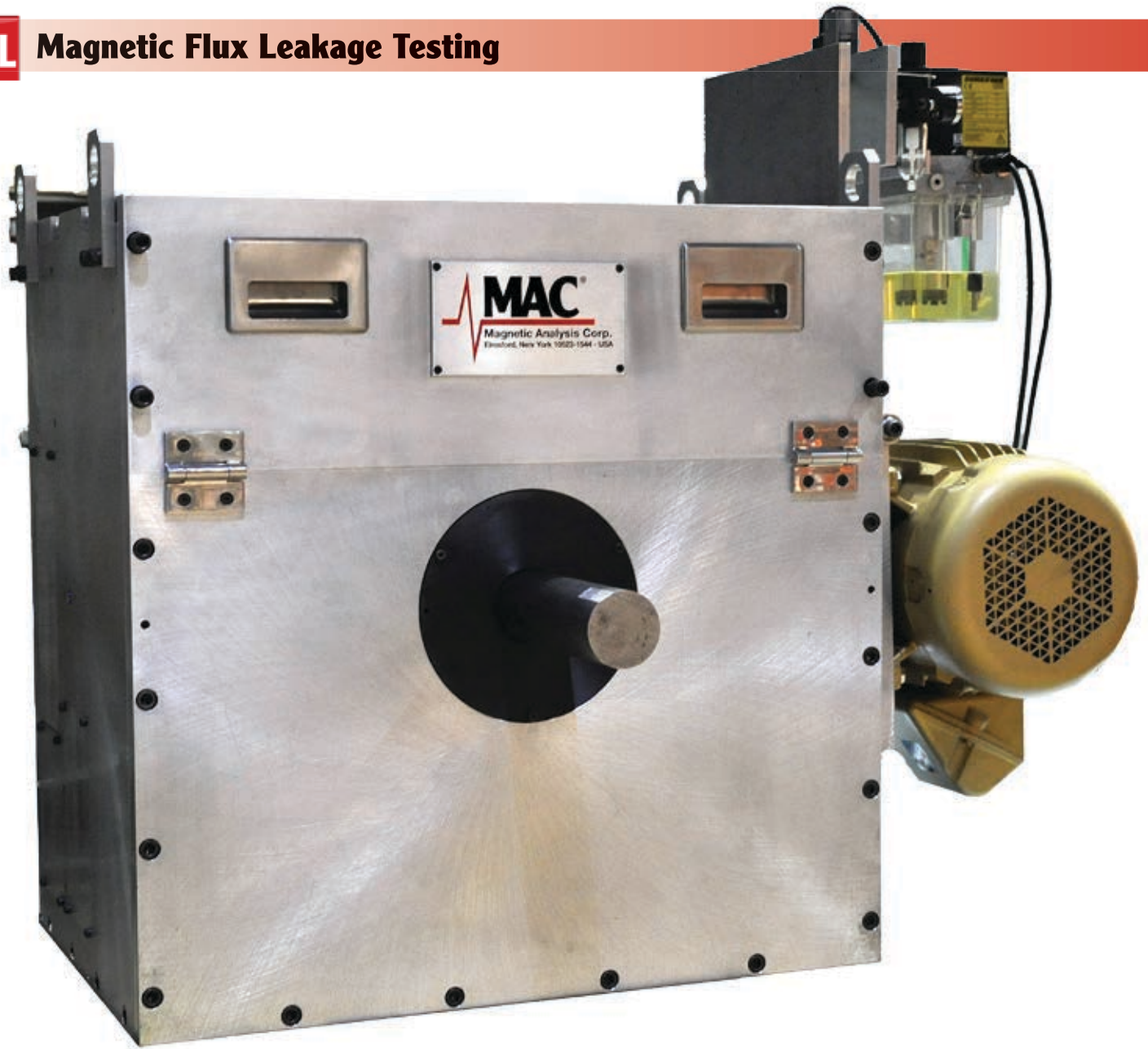
**Provide superior performance at test speeds up to 700 f.p.m.**

- 24 separate channels for longitudinal and 48 channels for transverse defect detection.
- Differentiates between OD and ID defects.
- Detects longitudinal and transverse defects as small as 5% of the tube wall on the OD and ID, depending upon material type and condition.
- LRFx rotaries use transverse magnetism to find longitudinal defects such as seams, laps and weld line defects.

- TRFX rotaries use longitudinal magnetization and provide 100% surface coverage to detect transverse defects.
- Pits, scabs, slivers, gouges, roll-ins, cracks and holes can be detected by either type of rotary, depending upon defect orientation.
- Systems are available to handle up to 500mm diameter and 19mm wall thickness tubes.

For more information about Flux Leakage Rotaries and Rotoflux® electronics, visit: [www.mac-ndt.com/technologies/flux-leakage](http://www.mac-ndt.com/technologies/flux-leakage)





## **NEW Rotoflux<sup>®</sup> AC Flux Leakage Tester**

***Finds defects less than .2mm deep.***

- Tests hot rolled bar from 20mm to 180mm in diameter.
- At the heart of the system is MAC Rotoflux<sup>®</sup> technology, which can find smaller defects than eddy current rotaries.

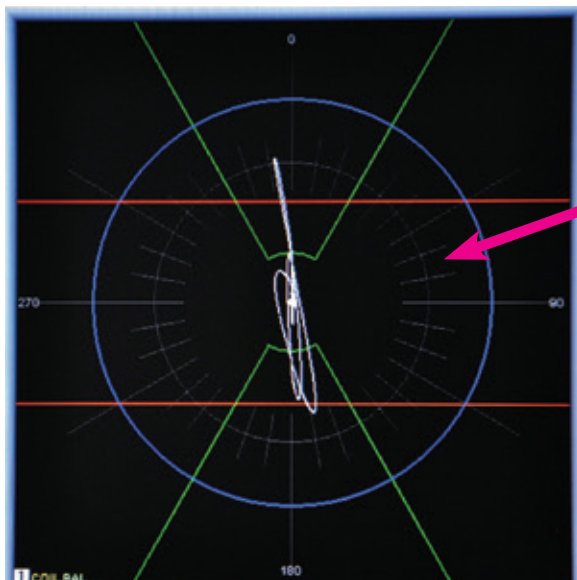
- Incorporates the latest multiplexing and wireless signal transfer to minimize noise while maximizing sensitivity.
- Ideal for products with surface conditions that often prevent detection of shallow defects.

🌐 For more information, visit: [www.mac-ndt.com/brochures/acfluxleakagetester.pdf](http://www.mac-ndt.com/brochures/acfluxleakagetester.pdf)

**B**

## ECT Eddy Current Testing

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.
- Housed in a 25x22x26" cabinet (655mm x 558.7mm x 864mm) with a built-in 17" touch screen monitor

Download the brochure at [www.mac-ndt.com/brochures/multimac.pdf](http://www.mac-ndt.com/brochures/multimac.pdf)



### 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.

Download the brochure at [www.mac-ndt.com/brochures/multimacsm.pdf](http://www.mac-ndt.com/brochures/multimacsm.pdf)







## 20mm Rotomac<sup>®</sup> HS Rotary

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

- Detects surface flaws such as seams and laps in products measuring from 2 to 20mm (0.0787-0.7874") in diameter.
- Operates at speeds up to 18,000 RPM for high production output.
- New and improved, easy-to-set-up Distance Compensation (a critical factor in the testing of ovate wire).
- Two spinning test probes can be adjusted with convenient dial-in diameter guide.
- Use for continuous wire operations such as drawing, spring-making, parts forming and shape and cut.

Download the brochure at [www.mac-ndt.com/brochures/rotomachs.pdf](http://www.mac-ndt.com/brochures/rotomachs.pdf)

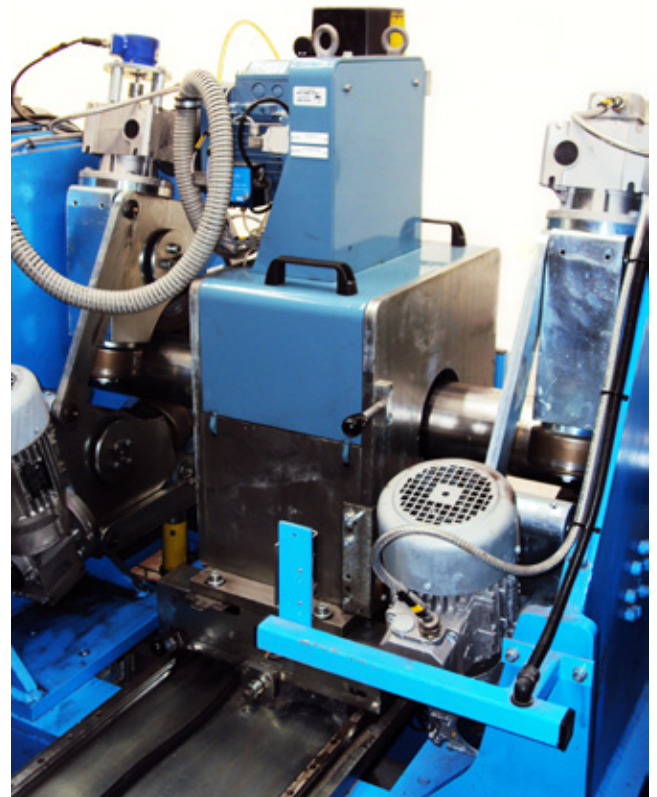


## Rotomac<sup>®</sup> Rotary Test Probe Technology

*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<sup>®</sup> 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 7.1" in diameter (3mm-180mm).

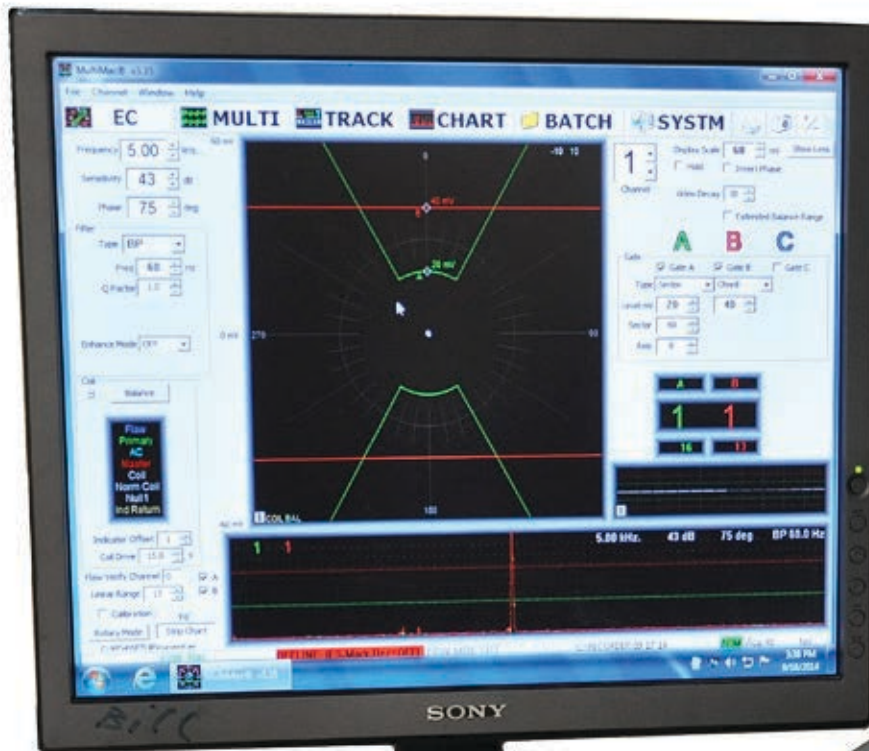
Download the brochure at [www.mac-ndt.com/brochures/rotomacrotrary.pdf](http://www.mac-ndt.com/brochures/rotomacrotrary.pdf)



# High-Performance Minimac<sup>®</sup> Compacts

**Affordable, single-channel Eddy Current Testers.**

- 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.
- When used with MAC's Parts Gates, sorts and counts at speeds up to six parts per second, into three separate groups.



## Minimac<sup>®</sup> 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.

Download the brochure at [www.mac-ndt.com/brochures/minimac50.pdf](http://www.mac-ndt.com/brochures/minimac50.pdf)

## Minimac<sup>®</sup> 55

**Tests cut lengths or continuous product.**

Download the brochure at [www.mac-ndt.com/brochures/minimac55.pdf](http://www.mac-ndt.com/brochures/minimac55.pdf)

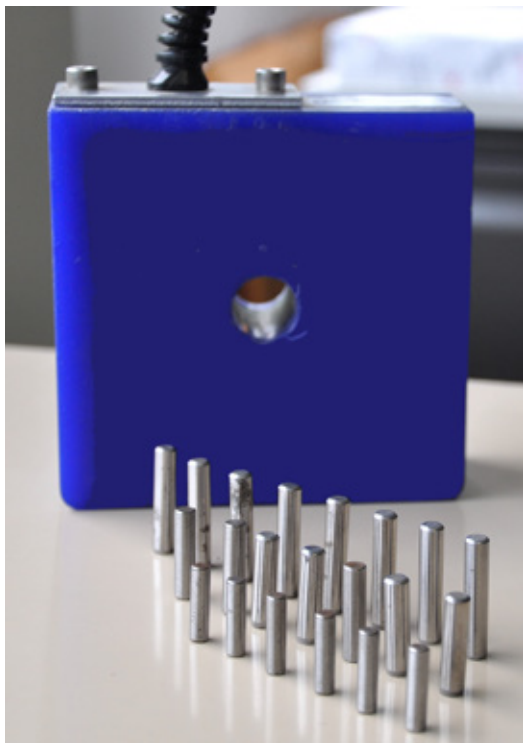


## **Varimac® VI**

*The latest in MAC's line of eddy current comparators.*

- 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.

Download the brochure at [www.mac-ndt.com/brochures/varimac.pdf](http://www.mac-ndt.com/brochures/varimac.pdf)



## **Production Comparator**

*Low-frequency tester for ferromagnetic materials.*

- Detects variations in alloy, heat treatment or case depth.
- Allows for rapid NDT sorting of ferro-magnetic 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.

Download the brochure at [www.mac-ndt.com/brochures/PCVI.pdf](http://www.mac-ndt.com/brochures/PCVI.pdf)





## Material Handling Equipment

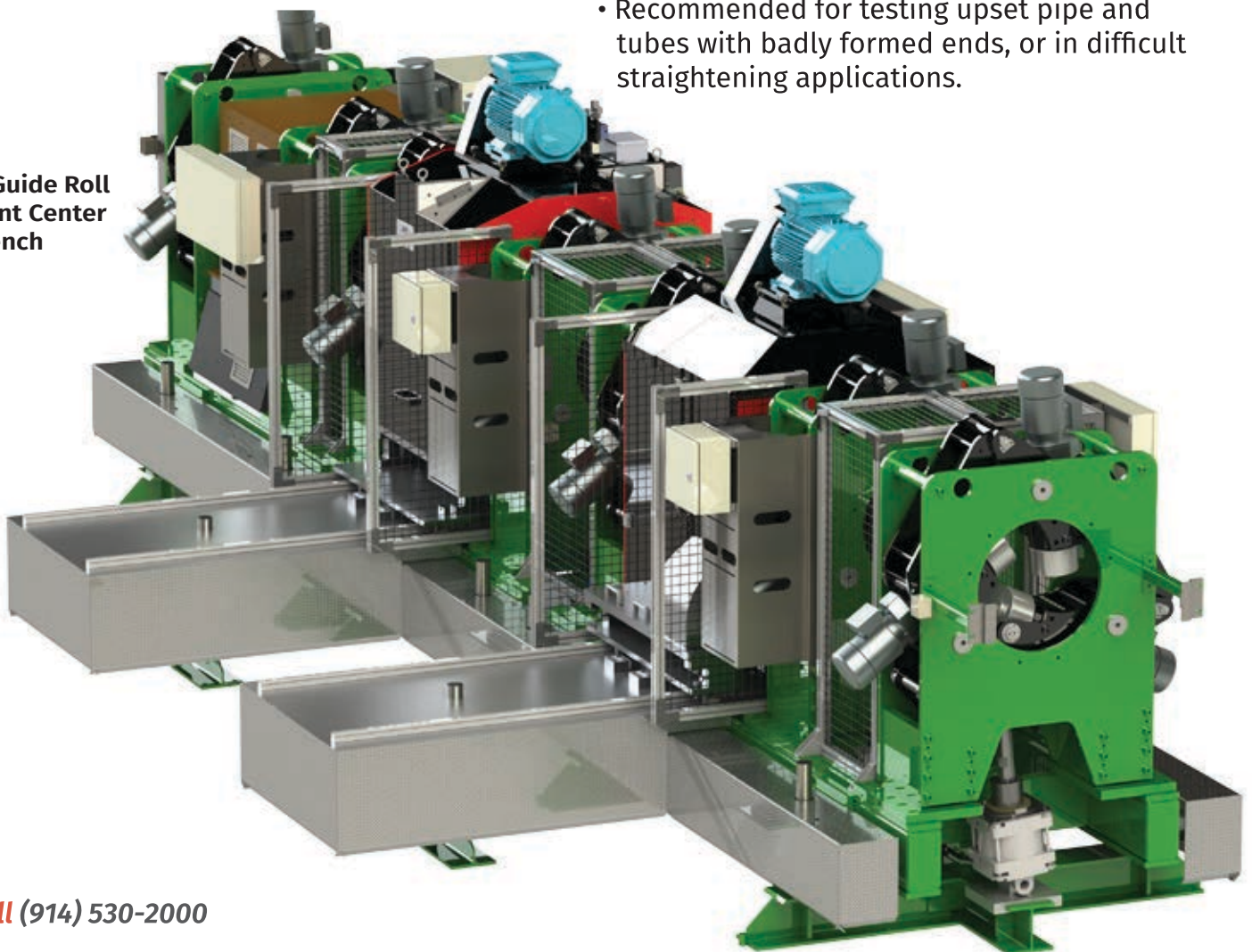
*MAC's full range of handling components help to ensure that NDT inspection systems reach their fullest potential.*

### 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 instrument and pinches.
- Extensive input/output configurations can be handled by programmable logic controllers (PLC).

 Download the brochure at: [www.mac-ndt.com/bulletins/benches.pdf](http://www.mac-ndt.com/bulletins/benches.pdf)

**Triple Guide Roll Constant Center Test Bench**



### “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.

## 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 previously purchased systems.

### ISO Accredited Test Facility

- Our Boardman, Ohio 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.

### Remote Pre-Acceptance

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

▶ See pre-acceptance in action at: [www.mac-ndt.com/videos/preacceptance](http://www.mac-ndt.com/videos/preacceptance)

### Expert Support and Training

- MAC's global network of field engineers, district managers, business development managers and field 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.





# Magnetic Analysis Corporation

103 Fairview Park Drive  
Elmsford, New York 10523 – USA

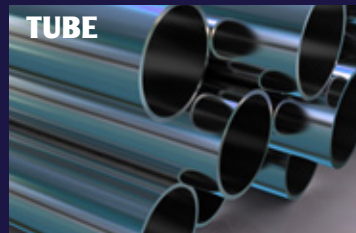
T: +1.914.530.2000

F: +1.914.703.3790

[www.mac-ndt.com](http://www.mac-ndt.com)

[info@mac-ndt.com](mailto:info@mac-ndt.com)

**Instruments, systems and solutions for nondestructive testing.**



Magnetic Analysis Ltd. – UK

[adodd@mac-ndt.com](mailto:adodd@mac-ndt.com)

+44 115 9303690

Magnetic Analysis Nordic AB. – Sweden

[info@manordic.com](mailto:info@manordic.com)

+46 63 51 77 20

Magnetic Analysis Italia S.r.l.

[info@mac-ndt.com](mailto:info@mac-ndt.com)

+39 0383 606 095

MAC Shanghai Representative Office – China

[china@mac-ndt.com](mailto:china@mac-ndt.com)

+86 21 62360955

Magnetic Analysis Australia Pty. Ltd.

[dterry@mac-ndt.com](mailto:dterry@mac-ndt.com)

+61 02 9631 6580

