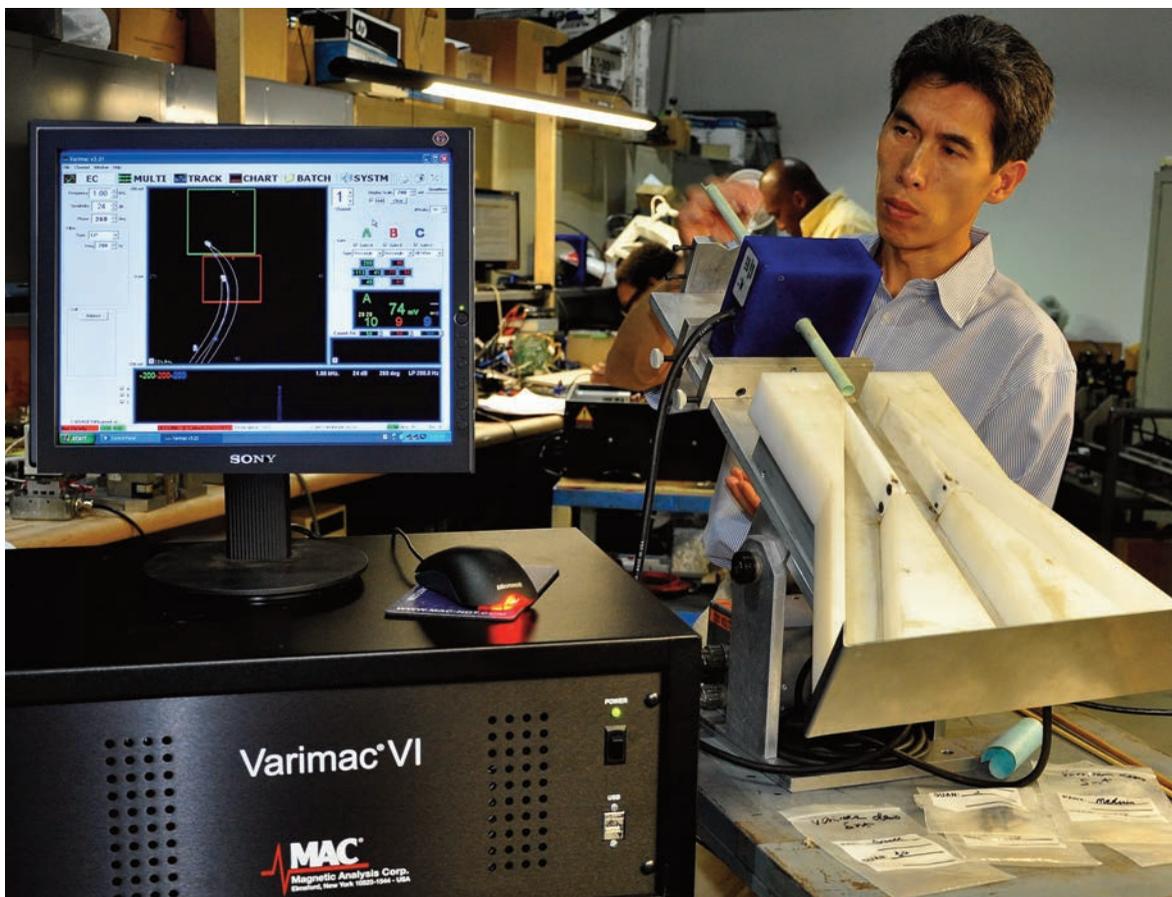


Testing Parts

Eddy Current, Electromagnetic, Ultrasonic, & Flux leakage Equipment



- ☑ Eddy Current, Ultrasonic, & Flux Leakage
- ☑ On Or Off Line Testing
- ☑ Hex, Round, and Other Dimensions
- ☑ High Speed, Continuous Operation

- ☑ Military Ordnance
- ☑ Automotive
- ☑ Medical
- ☑ Various Other Industries

Parts Tested



- ☑ Washers
- ☑ Coil Springs
- ☑ Bearing Races
- ☑ Inner Bearings
- ☑ Outer Bearings
- ☑ Roller Bearings
- ☑ Ball Bearings
- ☑ Ball Joints
- ☑ Pivot Bushings
- ☑ Fasteners
- ☑ Pistons
- ☑ Strut Rods
- ☑ CV Joints
- ☑ Expander
- ☑ Metal Gas Connectors
- ☑ Piston Pins
- ☑ Metal Stampings
- ☑ Rivets
- ☑ Nails
- ☑ Screws
- ☑ Clips
- ☑ Threaded Inserts
- ☑ Nuts
- ☑ Studs
- ☑ Roller Chain Plates,
- ☑ Bearing Pins, & Rollers
- ☑ Grenades
- ☑ Ordnance Shell Bodies
- ☑ Ordnance Shell Bases
- ☑ Medical Needles
- ☑ Surgical Blades
- ☑ Other Parts and:
Tubes, Bars, Plates, Wires

**Parts may be submitted for a free evaluation and analysis by MAC's very knowledgeable and certified engineers to determine the best NDT solution for your application.*

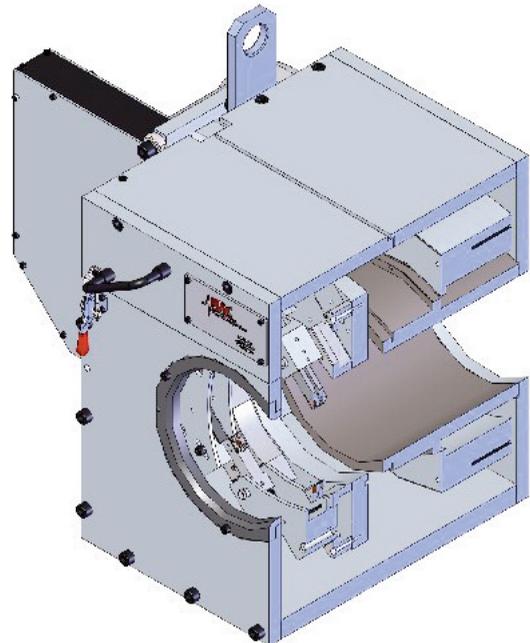


MAC can accurately detect alloy variations, heat treatment, case depth, hardness, geometry, and missing operations with an eddy current Varimac® or Production Comparator. A vibratory bowl or other mechanism feeds the parts through the test system where it is inspected and then sorted through MAC's parts gate into 2 or 3 categories; accept/reject or, above, within, or below specification. MAC's experienced Field Engineers can help integrate the customer's feed mechanisms with MAC testers.

Flaws Detected:

- ☑ Heat Treatment
- ☑ Case Depth
- ☑ Cracks & Hardness
- ☑ Alloy Differences
- ☑ Seam and Weld Defects
- ☑ Geometry

An eddy current rotary (shown at right) used in conjunction with MultiMac® electronics provides 100% coverage in detecting seam and weld type surface and subsurface defects including cracks, laps, and slivers.



For internal defects, wall thickness, and inside diameter measurement, the Ultrasonic Echomac® system with the FD electronics may be used.

Another method for testing parts and tubular products is MAC's Rotoflux® flux leakage system. This technology allows for the detection of transverse and longitudinal defects in heavy wall material. Custom systems including a combination of eddy current, ultrasonic, and/or flux leakage technologies may also be designed by MAC for special parts and conditions.

Examples of MAC Systems



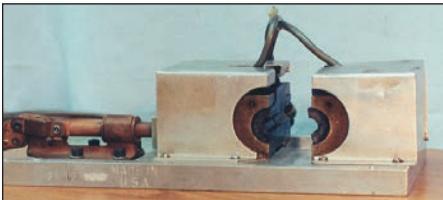
MAC uses its highly focused spinning probe eddy current technology to spot precision ground automotive parts such as fasteners inside the rotary. The probes test the "lands" in the parts (shown below) for seam detection.

Since seams run the entire length of the part, defect free parts are assured.

Besides being able to test wire, MAC can also test wire drawing dies that are used by wire manufacturers to draw the wire down to the diameter of the drawing die.



These dies vary greatly in their diameter, guide entry angle, materials, and hardness. The Varimac® sorts out dies with cracks that could cause extensive damage to equipment and substantial down time.



A Split Coil configuration used with MAC's eddy current systems is designed to allow attached protruded ends in wire to pass by expanding and retracting during testing. This system inspects discontinuities typical of welding.



A large flux leakage and eddy current tester was designed and installed by MAC to inspect military ordnance such as shell bodies, shown above, using three separate stations; a load station, a test station, and an accept/reject station. Two flux leakage tests were used for transverse and longitudinal defects, and eddy current tests for cracks and hardness included the Varimac® and the Production Comparator.

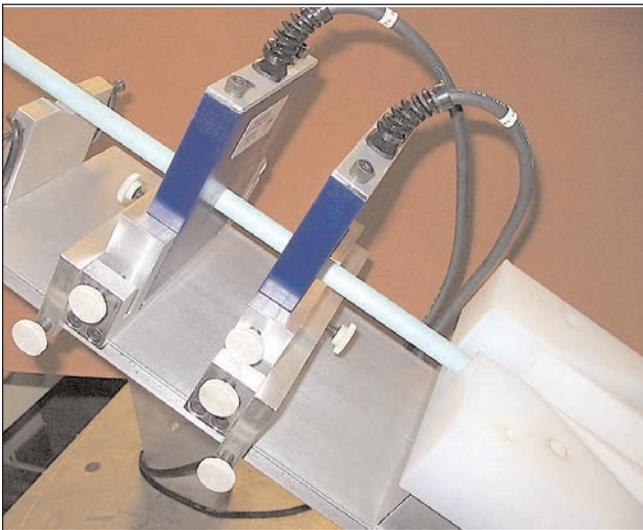


To inspect live grenades, this test system used robotic methods, operating behind a concrete wall to position the grenades for accurate and safe testing of longitudinal and transverse defects.



MAC's versatile Varimac eddy current comparators may accommodate numerous sizes and dimensions. A large parts manufacturer in Western Europe started out using MAC's systems to test expanders, a high performance sealing device for defects such as missing ball, chamfer, and threads, along with differences in stainless steel grades.

Now, MAC is currently providing more than 25 Varimacs to inspect over 1,000 different parts. Such parts include rivets, nails, screws, clips, nuts, studs, and many more.



Tension pins, also known as roll pins, made of various materials and dimensions are tested using the Varimac with Model 570 parts gate.

The conditions detected include cracks, deformation, missed operations, heat treatment, and alloy. In addition, a split coil arrangement (shown above) is used to detect differences in length in long pins that would otherwise require manual sorting.

MAC's Varimac® Eddy Current Comparator, shown at right, is used in a system for testing hardened steel washers. The test coil was modified with a slot and then used in a "pancake" mode. This system has a high signal to noise ratio and tests perpendicular to the crack, allowing positive defect detection at speeds of 1 part/sec.



A transverse flux leakage rotary (shown below) along with MAC's Rotoflux electronics, Triple Guide Roll Bench, and EZ drop pockets was designed for inspecting ERW welded, normalized, cold-worked and straightened tubes used for automotive suspension structures and cross members (axle housings). The tubes contain proprietary geometric characteristics that create variations in the wall thickness. This system includes defect detection such as weld defects, internal and external cracks, slivers, incomplete welds, and weld porosity as well as detection of variations in wall thickness.

