

- *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
 - Expanders
 - Metal Gas Connectors
 - Piston Pins
 - Metal Stampings
 - Rivets
 - Nails
 - Screws
 - Clips
 - Threaded Inserts
 - Nuts
 - Studs
 - Roller Chain Plates, Bearing Pins, and Rollers
 - Grenades
 - Ordnance Shell Bodies
 - Ordnance Shell Bases
 - Medical Needles
 - Surgical Blades
 - Other Parts and: Tubes, Bars, Plates, Wires
- *All 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.*

Flaws Detected

- Heat Treatment
- Case Depth
- Hardness
- Alloy Differences
- Cracks
- Geometry
- Seam and Weld Defects
- Missing Operations

Technology

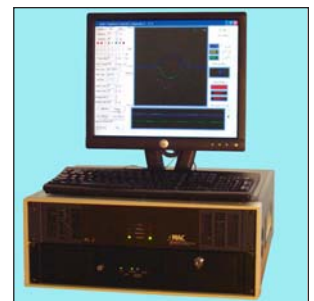
MAC can accurately detect alloy variations, heat treatment, case depth, hardness, geometry, and missing operations with an eddy current Varimac or Production Comparator (shown right). A vibratory or spinning bowl feeds the parts through the test system where it is inspected and then sorted through MAC's parts gate in 2 or 3 categories; accept/reject or, above, within, and below specification.



An eddy current rotary (shown on left) used in conjunction with a MultiMac, Multimac SM, or Minimac 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 FD4 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.

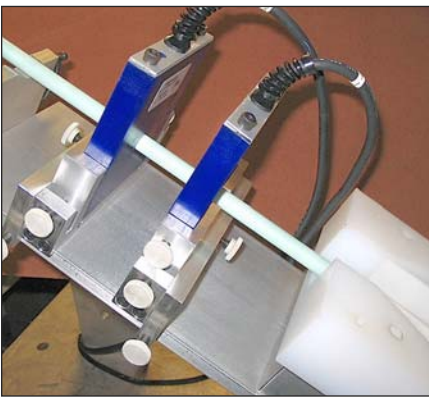


Examples of MAC Systems



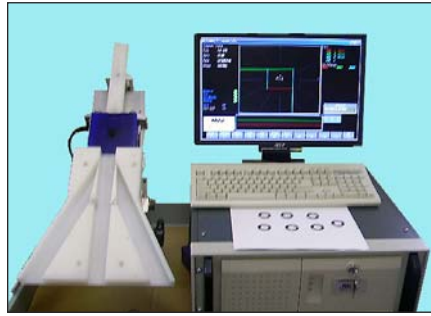
MAC's versatile Varimac eddy current comparators may accommodate numerous sizes and dimensions. A large parts manufacturer in Western Europe originally started out using MAC's systems to test expanders, a high performance sealing device for defects such as missing ball, chamfer, and threads, along with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



The above picture includes MAC's designed and implemented Varimac V 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.



MAC uses its highly focused spinning probe eddy current technology to stop 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.

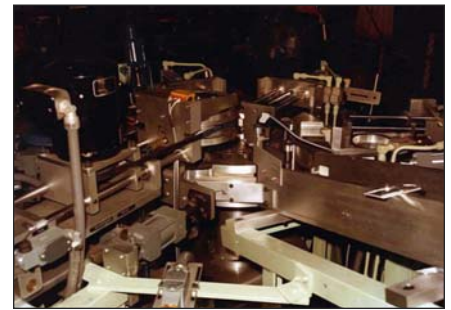
Besides being able to test wire, MAC can also test wire drawing dies that are used by wire manufacturers to draw the wire down to the diameter of the drawing die.



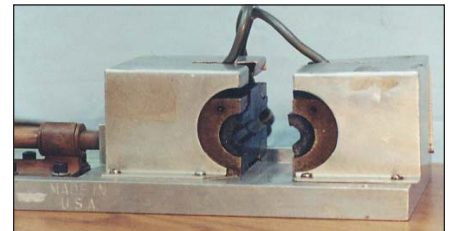
These dies vary greatly in their diameter, guide entry angle, materials, and hardness. The Varimac sorts out dies with cracks that could cause extensive damage to equipment and substantial down time.



A large flux leakage and eddy current tester was designed and installed by MAC to inspect military ordnance such as shell bodies (shown above & below) 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 (shown on cover page), the system operated behind a concrete wall using robotic methods to position the grenades for accurate and safe testing of longitudinal and transverse defects.



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.