



NDT METHOD INFORMATION

General Eddy Current Applications

General eddy current applications can be further subdivided into applications involving the measurement of physical property differences, such as flaws and thickness, applications involving the measurement of parameters relating more to conductivity, such as hardness, or applications involving the permeability changes in ferromagnetic parts. These are not clear-cut subdivisions because the physical parameters also affect coil impedance and material conductivity. Heat treatment also affects conductivity in nonferromagnetic parts and permeability in ferromagnetic parts.

Applications involving physical parameters first and permeability last are:

1. Detect and determine the severity of various surface cracks (stress, hardening, grinding, etc.), weld seams, laps, pits, scabs, porosity, voids, inclusions, and silvers.
2. Determine seam and seamless tubing integrity by measurement of % OD wall loss, intergranular corrosion, seam cracks, splits, and so on.
3. Measure flaws in graphite composites, aluminum, and titanium.
4. Detect and measure flaws in fastener holes.
5. Measure coatings and plating thickness. Measure nonconductive coatings on conductive materials.
6. Measure nonmagnetic conductive sheet thickness. Measure dimensional differences in machined, formed, or stamped parts.
7. Determine the integrity of wire cable. Detect and locate broken strands.
8. Detect wanted or unwanted metals in nonmagnetic materials. There is a broad range of metal detectors or "treasure finders" that can be placed in this category.
9. Determine metal powder mixture ratios and the degree of sintering in metal powder parts.
10. Determine the hardness and depth of case hardening in bearing rings and other parts.
11. Determine the effects of corrosion thinning in pipes and vessels.
12. Provide alloy indication and sorting.
13. Sort metallic materials by microstructure or grain structure.
14. Measure electrical conductivity. Conductivity is related to tensile strength in magnesium and aluminum alloys.
15. Determine heat treatment condition, degree of annealing, and effects of aging.
16. Determine the carbon content of various steels.

NDT METHOD INFORMATION

17. Determine alloy composition of ferromagnetic materials based on permeability.
18. Measure nonmagnetic coatings over magnetic materials.
19. Measure magnetic permeability or the effect of heat treatment on magnetic permeability.

Inexpensive 60 Hz eddy current comparators are designed to measure eddy current variations caused by differences in part size, shape, grade, chemistry or method of processing or manufacture. When eddy current testing is used to sort a known mixture of two alloys, instrument readings should be kept within the range of the readout device in order to detect the possible presence of a third alloy. Alloy variations in nonmagnetic materials primarily affect the conductivity of the part.