INSPECTION AIDS

By Arthur R. Lindgren

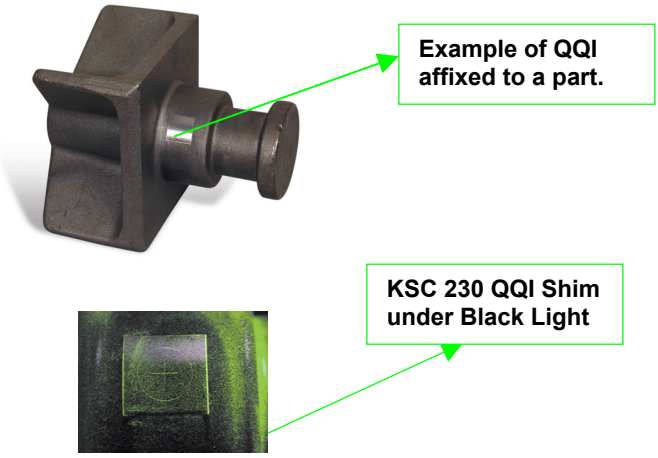
1.1 Hall Effect Meter

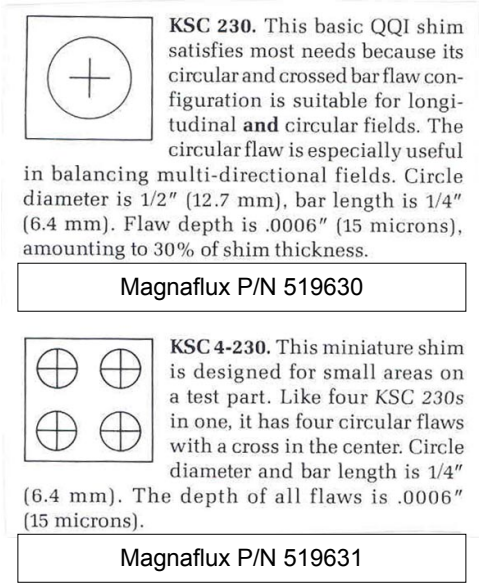
(Fig. 1.1) This is a meter and probe combination used for measuring the amplitude of either an AC or DC Magnetic field in gauss. In MPI, it's used to determine the amplitude of the magnetic field in air tangent to the surface (B_T) of a test part while the part is in a magnetic field. The small probe coil held close to the surface of the part, and held normal to it, to avoid reading any portion of the field leaving the part (B_N).

(Fig. 1.1) – Hall Effect Gauss meter
(Magnaflux P/N 521043)

1.2 Paste on Defects

(Fig. 1.2) Artificial flaw shims, laid or glued on to the surface of a part in a magnetic field, will indicate the direction of the field tangent to the surface (B_T) of the part. When used on magnetizable parts, they will assure sufficient field amplitude for developing readable MPI indications. They are used in producing a "System Performance Sample" when an actual part containing natural defects is not available. They work better with the wet method than with the dry method and are a convenient tool for use in balancing the fields in Multidirectional Magnetizing.





(Fig. 1.2) Paste on Defects - QQI's

The two pictured are called QQI's (Quantitative Quality Indicators) and are made of AISI 1005 steel which has an average material permeability and is very low in retentivity. Each is .750 inches (19mm) square and .002 inches (50 microns) thick. Flaw tolerance is plus or minus 0.5 micron. (Magnetizing Current Determination for more information.)

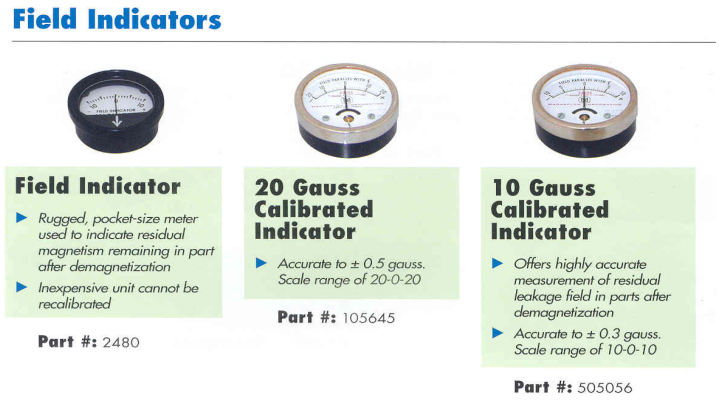
1.3 PIE GAUGE (MAGNETIC PENETRAMETER)

(Fig. 1.3) There are many types of pie gauges available, most of them about one inch (2.5 cm) in diameter and about 0.125 inch (3.2 mm) thick. When laid on the surface of a test part in a magnetic field, they indicate the direction of the field tangent to the surface of the part (B_T) and, to some extent, its amplitude. They are sometimes used along with a test part to verify "system performance" if a test part containing required defect is not available. They work better with the dry method than with the wet method. (See Section 23, Magnetizing Current Determination for more information.)

(Fig. 1.3)

1.4 POCKET FIELD INDICATORS

(Fig. 1.4) A pocket field indicator may be round or square, calibrated in gauss or not calibrated. They are used to determine the intensity of a magnetic field leaving a part (B_N) at some point on the part (pole). A given location on the indicator, usually marked with an arrow, is held against the part to read the magnitude of the pole. Square meter readings do not compare with round meter readings since the sensing elements are not located at the same distance from the surface of the indicator.



(Fig. 1.4) Field Indicators

1.5 TEST RING

(Fig. 1.5) A Steel Test Ring is 5 inches (12.7 cm) in diameter, about 0.875 inches (2.2 cm) thick, with a 1.25 inch (13.2 cm) diameter hole. When magnetized using a central conductor, the circular field developed in it produces leakage fields on the circumference of the ring near a series of drilled holes. It was first used in the 1940's as a means of checking the sensitivity of Dry Magnetic Particles. Its ability as a tool for grading the quality of wet suspensions of magnetic particles is controversial. Most users of MPI feel that parts with actual defects or even paste on defects provide a more realistic tool for comparing one type or size of wet magnetic particles to another.

Tool Steel Test Ring

- *Drilled holes simulate subsurface discontinuities*
- *Form surface indications at various magnetizing current levels*
- *Meets ASTM E 1444 requirements and certified to AS 5282*

Part #: 159999

1.6 BURMAH-CASTROL STRIPS (FIELD INDICATORS)

Burmah-Castrol Strips are about 2 inches (5 cm) long, 0.750 inches (1.9 cm) wide and 0.002 inches (0.50 mm) thick. They have normal permeability and are high in retentivity. They contain three sizes of defects and are available in two sensitivities, aerospace and automotive. Since they are retentive, they must be demagnetized each time before being used.

When laid on the surface of a test part in a magnetic field, they indicate the direction of the field tangent to the surface of the part (B_T) and are used to assure sufficient field amptitude for developing readable MPI indications. They are not suitable for determining a "balanced" field condition in Multidirectional Magnetizing applications due to being so retentive. They work better with the wet method than with the dry method.