

1.1.22. COERCIMETERS WITH A MOVABLE (ROLLING) SENSOR

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Coercimeters with an attachable repositionable magnetic device (ARMD) are widely applied to a non-destructive testing of mechanical characteristics, of deflected mode and fatigue state of ferromagnetic materials. In these tools all phases of determining a coercivity (c.) are performed with an ARMD immobilized in a check-point during whole measurement cycle. I.e. in order to measure a c. in other point, the sensor can only be repositioned. Disadvantage of such a method discontinuous in time and space: the limited speed because of necessity to keep a constant position of an ARMD during whole cycle of measurements (nearly 5 – 10 s); dependence of meter readings on a ratio of the dimensions of products having a large surface (plates, sheets, etc.) and of "operating floor" of ARMD; impossibility of plotting a continuous distribution pattern of c. magnitude on the product surface; automation of c. measuring process is problematic with such a repositionable sensor.

Coercimeters with a mobile ARMD, where process of measuring c. is free from the indicated deficiencies. It is continuous in time and along the monitoring line. Here the movable ARMD, as well as its repositionable varieties existing till now, contains a magnetizing element (ME) and a magnetometric unit (MU), however inside it these parts are mutually spaced so, that when moving on surface of the monitored item, magnetizing element create on it a band with a remanence, and the MU located behind it makes a continuous reading of parameter, which is proportional to c. of the segments of magnetized band.

Magnetizing is ensured by two-pole ME, for example, on the basis of opened C-shaped systems closed by the monitored product. It can be an electromagnet or a device on the basis of permanent magnet. Thus readout of the parameters proportional to c. is made so, that the result does not depend on the horizontal dimensions of the product, i.e. obtained c.'s values practically correspond to properties of the monitored material. The report is accompanied by demonstration of a series-produced portable coercimeter with a manual rolling sensor, and also by frames showing an operation of the creeping robot-diagnostician estimating a metal fatigue state of the vessel hull and tank shells of store-houses of oil and gas of the large capacity. In order to increase efficiency and reliability in this robot the particular coercimeter with a rolling sensor is used.