EDDY-CURRENT TESTING WITH DEFECTOMAT

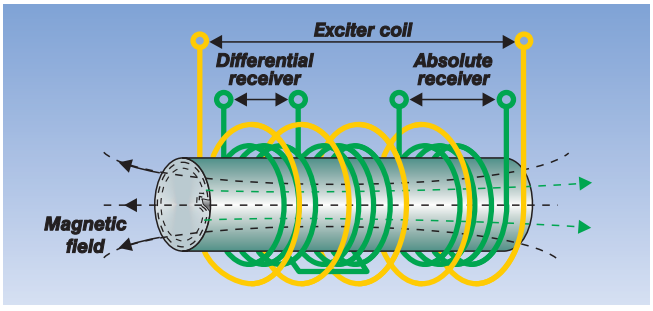
FOERSTER

Eddy-current method
Application and basic function

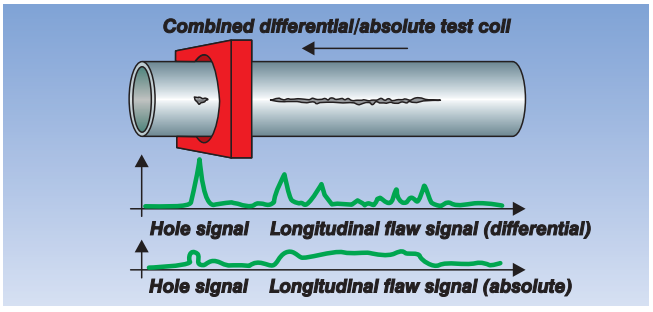
Economy aspects for testing with FOERSTER®

Eddy-current testing is the worldwide standard when producing tubes, pipes, bars and wires. It is the only non-destructive test method which also allows 100 % testing even at extremely high production speeds. Other advantages are the simple operating principle, the fact that parts are tested dry without physical contact and the automatic detection, marking, classification and sorting of the flawed material. Modern test systems allow uncompromising integration in the production process, including extensive documentation, as is indispensable for compliance with ISO 9000 ff and within the framework of product liability. So-called test sections of various designs guaranteeing optimum transport of the test material through the sensor system are available for establishing separate testing lines. The eddy-current method complies with the international Standards of ASTM, API, BS, AF, DIN, EN, ETTC, JIS, SEP and others. The DEFECTOMAT family from FOERSTER, a series of instruments which has been modernised constantly, has been a synonym for maximum reliability and continuity for many years now. The aim is to cooperate with our customers on a partnership basis by developing intelligent series products and individual system solutions.

Be in pipe welding lines, rod mills, wire drawing lines or finishing shops, the reliability and cost-efficiency of the DEFECTOMAT test equipment are evident everywhere.



Semifinished products, such as wires, bars and tubes, are tested for local crack-like and void-like flaws using circumferential through-type coils. A crack disturbs the propagation of the eddy currents generated in the test material. This produces the related flaw signal in the receiver coil.



The differential through-type coil detects void flaws and transverse flaws with high sensitivity and detects longitudinal flaws according to their depth gradient. The absolute through-type coil indicates serious longitudinal flaws, e.g. unwelded tubes, over their entire length.

The DEFECTOMAT family

From the simple module with plain Yes/No results through to the multi-channel system with statistical evaluation programs. Circumferential or segmented through-type coils allowing maximum testing speed are always used. Typical fields of application are pipe and tube welding lines, drawing machines and finishing lines. Thin lamp wires with a diameter of a few micro meters and heat-exchanger tubes are also tested with DEFECTOMAT.

... the right model for every application

DEFECTOMAT ECM

The module for eddy-current testing with through-type coils reduced to the essentials. Extremely easy operating controls, unidimensional signal display as LED bar graph, Yes/No sorting.

Easy integration in existing control cabinets.
The testing line controller (PLC) also controls and forwards the results of the EC module for marking and sorting. Parameter setting via RS-232 interface is possible.

DEFECTOMAT CI Compact EC tester

The original compact eddy-current tester now with new technology. It is the successor of the globally successful DEFECTOMAT C and CP versions. One of the new features on offer is the fully optional 2-channel evaluation, which allows e.g. the simultaneous use of the differential and absolute channel, 2-frequency applications and simultaneous signal evaluation in the eddy-current and FERROMAT® channel.

DEFECTOMAT DS

The top-of-the-range model for eddy-current testing with through-type coils. The instrument system, based on Windows®, allows convenient operation and uncompromising network integration. Modern touch-screen technology and application wizards simplify dialogue and prompt the operator reliably when making all instrument settings.

The system utilises the power of Windows® in relation to networking capability and multi-tasking. Thus, FOERSTERnet® allows access to the test-instrument from any number of computer workstations simultaneously even if the various users require different information, e.g. current test status, test result of the last tested job or a batch from last month for reasons relating to research.

DEFECTOMAT DS – THE TOP-OF-THE-RANGE MODEL

DEFECTOTEST® DS 2000

This is the instrument concept for electromagnetic testing using digital technology which forms the platform of the DEFECTOMAT DS for multi-channel applications and allows adaptation to individual requirements. FOERSTERnet offers access to the DEFECTOMAT DS test instrument from any number of computers and allows uncompromising network integration in existing production and quality systems. Implementing the system on the basis of Windows® ensures easy integration and convenient operation and offers Active X interfaces to other Windows® programs. Application wizards prompt you interactively, allowing you to reliably achieve the right instrument setting. Automatic adjustment and compensation procedures guarantee reproducible testing. Integrated diagnostic functions ensure that the automatic test result is reliable. Archiving of all test results allows individual result summaries for short and long-term documentation and for research.

Production

Shipment

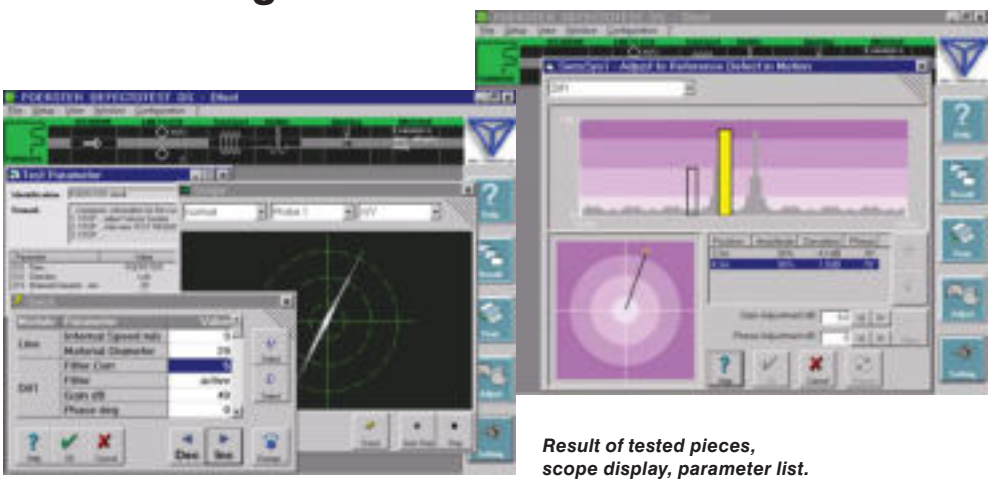
Production

The screen, designed as a touch screen, allows easy, prompted operation simply by touching the screen surface. A keyboard is available for text input. Real-time visualisation of the test sequence with original signal display provides a complete overview at all times.

Shipment

Documented quality to ISO 9000 thanks to user-specific, automatic logging.

DEFECTOMAT DS – meets most stringent demands. On tube and pipe welding lines, drawbenches, winders, rolling lines and finishing lines ....



Result of tested pieces, scope display, parameter list.

ECONOMICAL SOLUTIONS FOR YOUR PRODUCTION

Statistics

Remote Servicing

Statistics

Individual analysis of the test results with Microsoft® Office tools thanks to direct access to the result database.

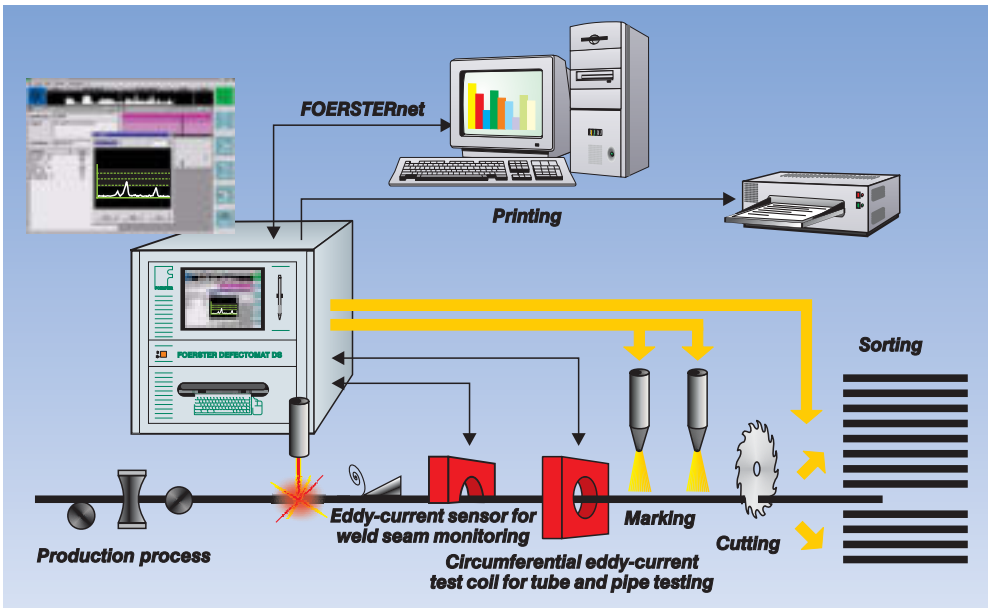
Remote servicing / FOERSTERnet

Direct communication with the test instrument and interworking with other networks (LAN and WAN).

DEFECTOMAT DS production-integrated eddy-current test system

System technology

Eddy-current test system with digital technology for automatic, high-resolution, multi-channel flaw testing on wires, bars, tubes and pipes made of ferromagnetic and austenitic steels or non-ferrous metals. Universal test system which can be adapted to individual applications and requirements. Multi-channel capability means testing with several test frequencies or with different sensor systems which may also be at different locations. Configurable test sequence programs for piece testing, continuous testing and testing with subsequent cropping simplify matching to production conditions. Extensive test documentation for each part and each flaw allow subsequent research and form the basis for product liability. Continuous monitoring of operational safety and reliability is a foregone conclusion.



The DEFECTOMAT DS eddy-current test system on a tube/pipe welding line with two sensor systems.

Compact instrument DEFECTOMAT CI

State-of-the-art data communication

- State-of-the-art computer technology
- Full network integration
- Remote control of the settings
- Takeover of the result data
- Periphery diversity with USB port for memory stick, modem, printer, mouse, keyboard (also wireless), CD burner, portable hard disk, card reader etc.
- Data export and import using a memory stick
- XML log structure for every tested part and every order can be displayed by standardized format using Internet Explorer

Optimum technical performance

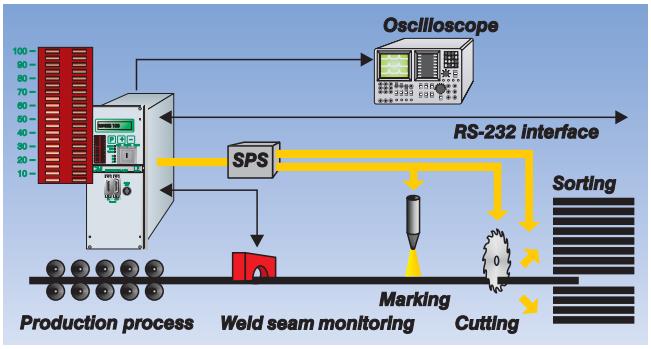
- Optional, full 2-channel evaluation Diff/Abs, Diff/Diff, Diff/Ferromat
- 12 test frequencies from 1 to 1000 kHz
- Filter tracking according to the test speed
- Point exact, location-precise marking
- Sector signal evaluation with 2 trigger thresholds
- Analog output

Intuitive operation

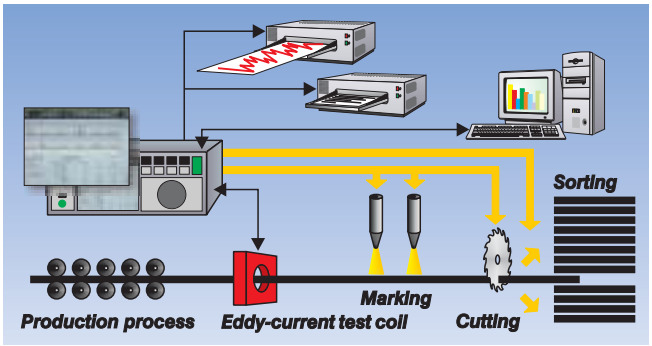
- Quick and easy with “turn and push”
- Password-protected operating level
- Easy to read colour screen
- Visualisation of test sequence
- Constant display of the most important test parameters
- Unlimited settings archive
- Stored sensor list with features

Availability and service

- Sensor monitoring based on the noise level
- Recognition of cable break and short-circuit
- Remote service via telephone, modem or Internet Log-in
- Logged calibration including sensor
- Simple replacement of the predecessor model through pin-compatible line and sensor connections



ECM in a tube or pipe welding machine.



CI on the production line.

Integratable module DEFECTOMAT ECM

- Module for eddy-current testing with through-type coils, reduced to essentials
- Different fixed-frequency modules are available
- Multi-frequency modules are available as options
- Extremely easy-to-use operating controls
- Unidimensional signal display in the form of LED bar graph
- Yes/No sorting
- Enhanced operating convenience and result display by PC connection in conjunction with the eddyWin software package
- Easy integration in existing control cabinets
- The module can be adapted to more extensive requirements using further components as phase adjuster, absolute channel, power amplifier, oscilloscope, RS-232 interface for remote parameter setting
- Adapters store configuration data for fast conversion

Magnetising yokes, coil holders, cooled coil systems and segment systems

Sensor system P

Permanent magnetisation may be adequate for small cross sections or for austenitic materials. P 12 for material up to 12 mm and P 40 for material up to 40 mm diameter.

Sensor system H

Coil holders H 40 and H 90 are available for circumferential testing of non-ferrous metals in the diameter range 0.2 to 90 mm. Diameter-adapted guides with a somewhat smaller diameter protect the coil.

Sensor system M

Magnetising yokes (M 40, M 90, M 140, M 170, and M 240) are available for testing ferromagnetic material. In general, circumferential coils are used. Size-adapted steel nozzles which simultaneously protect the coil are used for magnetisation. Segment coils can also be used. If magnetisation is performed during eddy-current testing, it is generally necessary to demagnetise the test pieces again after testing. Demagnetisers EMAG M and F which are integrated directly in the testing line are available for this purpose. Solid material can be magnetised and demagnetised up to moderate cross-sections (diameter approx. 60 mm). The yokes are operated with a yoke current box.

Sensor system P 12 with entry nozzle air

Sensor system H 40

Sensor system M 240

Sensor system LSM

Sensor system LSP

Sensor system S

Segment coil holders with electromagnetic yoke LSM 180 and with permanent magnetisation LSP 180 are offered for partial testing with partial longitudinal magnetisation. Special versions are available for sizes greater than 180 mm. Coil holders SH 180 are available for testing non-ferromagnetic materials. The height of all sensor systems S can be adjusted by means of a stand.

Sensor system FD

A fine-wire sensor system is used for testing tungsten and molybdenum wire for the lamp industry in the diameter range 0.1 to 2 mm. Special-purpose, small coils with differential and absolute winding and nozzles in addition to guide elements are adapted to this application.

Sensor system T 60

Sensor system T 60

A rugged sensor system matched to the rough conditions, including guide elements, has been developed for use on hot-rolling lines (at temperatures up to 1,200 °C and rolling speeds up to 150 m/s). Water-cooled coils and guides for material with diameters ranging from 5 to 60 mm are available. Special guide elements steady the wire and ensure that it is guided as centrally as possible.

Sensor system FD

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