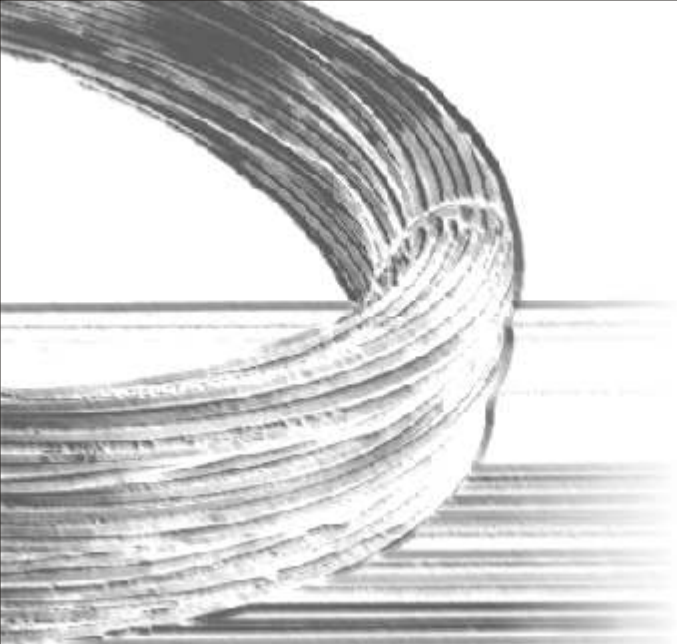
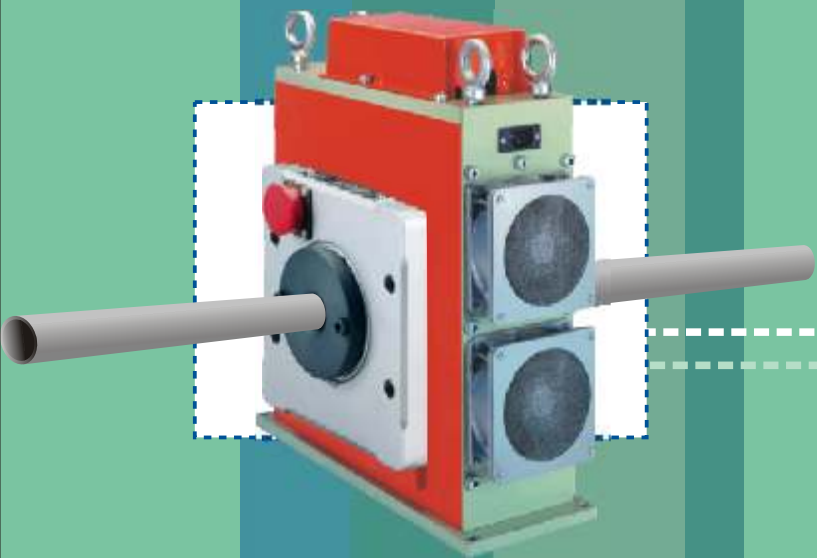




FLAWMARK SP

Advanced Differential and Absolute
Eddy Current Test System
For Non-destructive Inspection
of metal Tubes and Wires



FLAWMARK-SP

Flawmark-SP is a versatile Eddy Current Test System with an amazing set of features and specifications. The system is specially crafted for non-destructive inspection of tubes and wires made of ferro-magnetic, austenitic and non-ferrous metals. Defects such as cracks, pin holes, open welds, voids, inclusions, concentrated porosity, weld defects, mechanical damage, slivers, opened up skin laminations and deep pittings are reliably detected and marked by the system. The system is meant for detection of predominantly transverse defects on tubes, wires and wire rods.

The versatility of the system allows it to be employed in several configurations. It can be used in online (before cropping the tubes), inline (right after cropping the tube), offline (stand-alone with a separate handling system) as well as in continuous (coiler- decoiler) site modes. The system supports both encircling as well as segment test heads. Inspection can be carried out as per API, ASTM, BS, DIN, ETTC, JIS, IS or other relevant standards.

Flawmark-SP comes with a differential channel as standard. An absolute channel can be added as an option. A modern Graphical User Interface with colour monitor and keyboard makes operation of the system very easy and intuitive. The system can also stream data over an RS-232C serial link. The system can be supplied in a floor-mount full height cabinet or a table- mount half height cabinet.

Mechanical handling systems and automatic sorting systems are also available.

FEATURES

Digital Control

All test parameters are set and controlled digitally. There are no potentiometers or dials to twiddle. Settings, being digital, are precisely reproducible.

Data Entry

As the settings and parameters are entered through the keyboard, the processor watches out for, and prevents, possible errors such as value of the upper threshold attempted to be set lower than the lower threshold.

Data Communication

The system can communicate with an external computer via an RS-232C serial link. Test results can be sent to the computer in real time. The computer can query the system for any or all parameters.

The system can be operated completely remotely if so configured.

Data Reporting and logging

Test parameters and batch results can be printed on a PCL-3 compatible inkjet or laser printer attached to the parallel port. If a computer is connected to the serial link, data can be logged on the hard disk for further analysis.

Visual Setup

Especially useful in online configurations, the differential gain and phase can be visually set on the basis of signals obtained due to standard defects. Just "show" where you want the signal.

Automatic Tracking Filters

Eddy current response to defects in



SATURATION COIL

The Saturation Coil is used to saturate the ferromagnetic tubes to suppress the signals due to magnetic permeability variations. It has inbuilt temperature sensors to protect it from over heating. The saturation coil is available in three models.



ENCIRCLING TEST HEAD

Encircling test heads are used where the entire circumference of the tube has to be checked. A wide range of test heads are available for inspection of tubes of 1 mm to 180 mm OD to suit a wide range of application. Test heads are available in multi-differential, differential, absolute and special winding configuration to suit particular applications.

dynamic test systems such as Flawmark-SP is speed dependent. The same defect, passed at different speeds, might show a different signal amplitude and phase unless filters are dynamically adjusted to varying mill speeds that may occur in a typical tube mill. Flawmark series pioneered filters that track testing speed and automatically adjust themselves to optimum values.

Three modes of Evaluation

Flawmark-SP supports three Evaluation modes: Phase sensitive (which has linear horizontal thresholds), amplitude (with circular thresholds) and sector (which is a combination of the above two, with sector-segment thresholds). Together, these allow you to choose the optimum evaluation mode for your tests.



MAGNETIC YOKE

This houses the segment test head when the system is used for inspection of weld zone only. The magnetic yoke is used to saturate the ferromagnetic tubes to suppress the signals due to magnetic permeability variations. The magnetic yoke is also available with swivelling and balancing mechanism to take care of weld-line deviation.

Paint Markers

Two thresholds are available in differential channel. They are simply called "Upper" and "Lower" thresholds. Two paint marker outputs are available corresponding to these thresholds. In systems with absolute channel, a third paint marker output is available.

Signal Interfaces

Opto-isolated inputs and outputs are available for interfacing with encoders, proximity detectors and pneumatic solenoids etc. Thus, automation is very convenient in all configurations.

Test coils and probes

Flawmark-SP supports encircling test heads for tube diameters up to 180mm. In case of welded pipes, only the weld zone



SEGMENT TEST HEAD

Segment Test Heads are used where the requirement of Eddy current inspection is restricted to weld zone only. A wide range of segment probes are available for testing of upto 520 mm (20" NB) pipes.

can be tested using segment probes.

Power-on and watchdog diagnostics

The system goes through self-checks each time it is powered on. In addition, it keeps looking out for error conditions during operation. This adds to the reliability and dependability of the system.

On-line Help

Context sensitive hyper-text help is available. Moreover, the entire operation manual is also online. Thus, at any moment, help is just a key-press away.



MARKER UNIT

Marker Unit is used to mark the defective area of tube. Marker Unit can hold 2/3 Markers. The Marker can be Bowl-Type-Ink Marker or Aerosol-Can Type Paint Marker.

TECHNICAL DATA

Test Configurations:

- Online, Inline, Offline or Continuous

Test Frequency:

- 1 KHz to 1000 KHz
- Optional extended range up to 4 MHz

Eddy Current Channels:

- One differential is standard
- An additional absolute channel is optional

Signal Gain:

- 20 dB to 80 dB in 0.1 dB steps (differential)
- 20 dB to 60 dB in 0.5 dB steps (absolute)

Phase:

- 0 to 359 in 1 steps (differential)

Evaluation modes:

For differential:

- Phase sensitive
- Phase + Amplitude (Sector)
- Amplitude

For Absolute :

- Amplitude

Thresholds:

- Two independent amplitude thresholds and Two independent sector thresholds (differential)
- One amplitude threshold for absolute

Filters:

- High-pass 1 Hz . 250 Hz
- Low-pass 2 Hz . 500 Hz
- Filters can auto-track in Online - configuration

Balance:

- Differential channel does not need balancing
- Absolute channel has smart auto-balance

Setup:

- Manual or visual at user-selected frequency

Parameter storage:

- Up to 100 sets can be stored and recalled

Alarms:

- Internal beeper. Outputs for external alarms
- "Lamps" on screen
- Paint Marker outputs (opto-isolated TTL)

Display:

- Real time vector display with thresholds as well as real time y-t (strip-chart) display (differential)
- "Bar-graph" display for absolute signals

Printing:

- PCL-3 compatible inkjet/laser parallel

port printer can be attached for printing parameter sets, statistics, stripchart signal and screen prints

User interface:

- Graphical User Interface on VGA monitor with keyboard for input

Digital I/O:

- Opto-isolated logic-level Inputs/outputs required for sorting automation are provided

Serial link:

- RS-232C serial link with optional software for remote operation. Results can be sent via RS232C realtime

Test Standards :

API 5L / API 5LX, ASTM A450, B5 3889, ETTC, JIS and other relevant international standards

Tube Sizes that can be tested :

- 1mm to 180mm dia OD with Encircling Test head
- 100mm to 520mm with Segment Test head

Magnetic Saturation and

Demagnetisation Units are available as per requirement.

Mechanical Handling Systems are also available



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