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**NON-DESTRUCTIVE EVALUATION**

**Automated Eddy Current Testing System  
For Bright Bar Inspection  
by,**

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## **Abstract**

In recent years among different NDE Methods used for inspection in various industries Eddy Current Examination Method has become popular for detection of mainly surface flaws in large number of industrial items. To meet large production inspection requirements, automated ECT using on line or off line systems have been developed and are in very much use by various units manufacturing Black Bars / Bright Bars / Tubes. The paper deals in particular with ECT systems for inspection of small dia. meter Bright Bars.

### **ECT System for Bright Bar Inspection:**

Multi-channel Eddy Current Test System for detection of longitudinal surface flaws using Rotary Probes and Encircling Coil for detection of transverse surface flaws in bright bars.

The paper mainly describes in brief the Test System, Test Technique, ECT Probes / Coils used in the system, Reference Calibration Standard used, Marking & Sorting arrangements, Data Logging and Test Report Generation.

***Key Words: ECT Bright Bars, Rotary Probes***

## **Job Description :**

Diameter : 2 to 20 mm

Length : 2 to 8 mtr

Material : Carbon Steel / SS

Test Speed : Up to 3 meter/sec., for 100% coverage

## **Test Task :**

Axial discontinuities on the surface

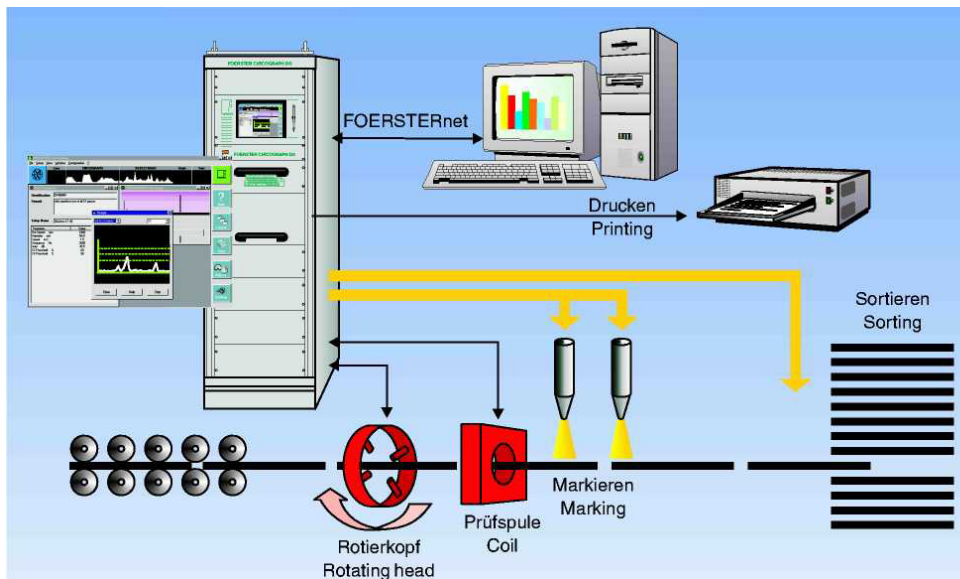
Transverse discontinuities on the surface

## **Features :**

- Multichannel Test System having Rotary Probe & Encircling coil.
- Rotating Head with 2 probes for Longitudinal Flaws- Highly sensitive, contactless testing for mainly longitudinally oriented surface flaws
- Encircling Coil for Transverse Flaws
- Electronic clearance compensation in the entire diameter range with CIRCOGRAPH DS
- Demagnetization
- PLC & HMI based Control System
- PC based data logging & test report system
- Detection level: For Longitudinal Defects up to 50 micron depth, 5 mm length & Larger
- For Transverse Defects, 0.2mm depth, 1mm dia

# Technique

The Rotary Probe sensor systems, Ro 20 operate on the basis of Eddy Current principle in accordance with ISO 15548 which permit a highly sensitive, non-contacting testing with Electronic clearance compensation of ferromagnetic, austenitic and non-ferromagnetic round material (wire, bar, tube) mainly for detection of longitudinally oriented defects as well as Encircling Coil for detection of Transverse Flaws in combination with testing and evaluation. Electronics CIRCOGRAPH® DS and a suitable transport mechanism.



# Probe Rotating Test Head :

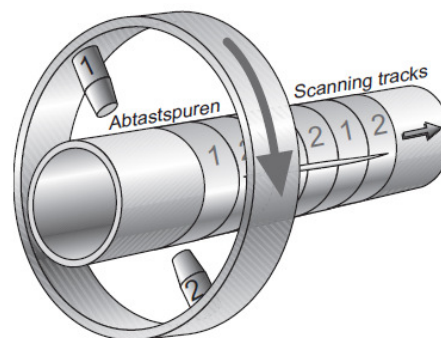
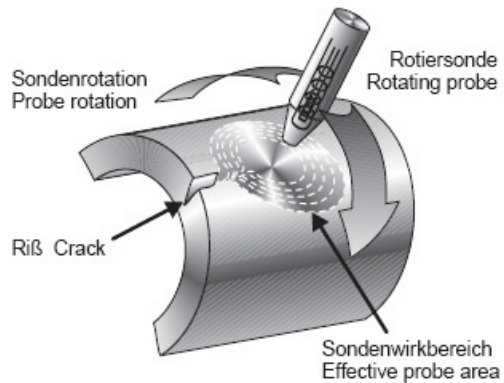
Rotating speed : Up to 18000 RPM

Dia Range : 2 to 20 mm

Probe Head 2 Nos. with one probe each at an offset of 180°

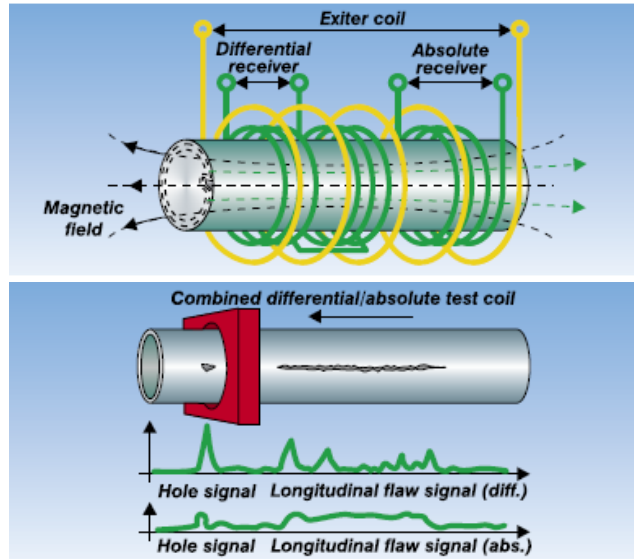
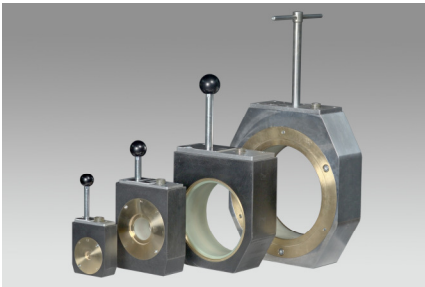
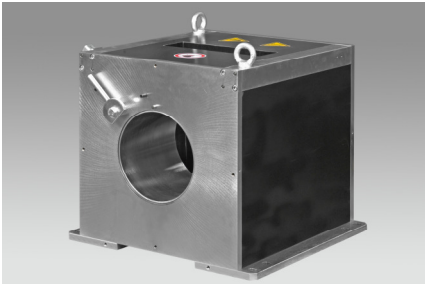
Probe Track width : 1.5 mm/ 2.5 mm/ 5 mm can be selected

Transportation Speed  $V_s =$   
Scanning track width  $B_s \times$  Number of Probes  $\times$  Rotating Speed



# Encircling Coil :

In type M Sensor Systems as the test piece passes through the Coil, Electrical testing signals are generated by the Electromagnetic interaction set up between the test piece and test coil. The physical method of operation is in accordance with German Standard DIN 54 140. For most testing tasks type LMD through-type coil using Differential circuitry are installed in the type M Sensor Systems.



# Test Electronics :

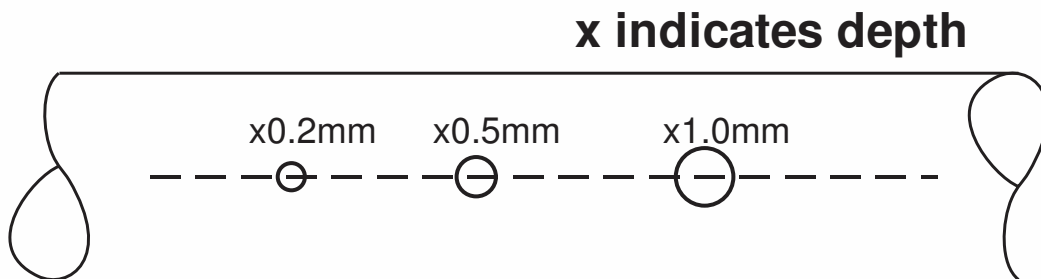
The Test Electronic Circograph DS is a Multichannel Electronics with high resolution for surface discontinuities on Wire, Bar, Tubes made of Ferromagnetic & Austenitic steels and Non- Ferrous Metals.

## Unique Features :

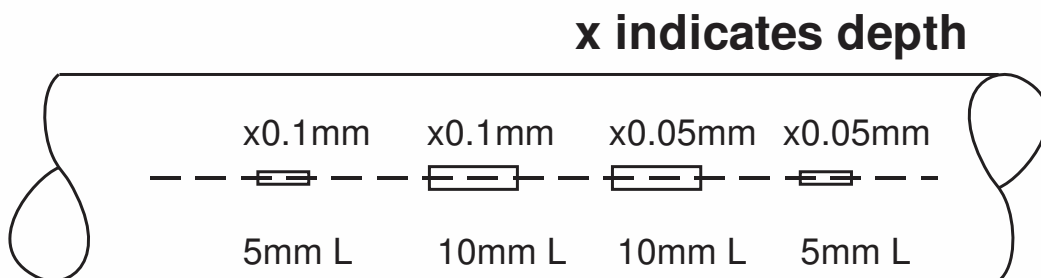
- Window based operation
- Touch Screen as well as Keyboard & Mouse operation
- Multichannel compact unit suitable for Rotating probe as well as Encircling Coil.
- Real Time Visualization of Test Sequence & testing.
- Remote service - Direct connection via LAN & WAN



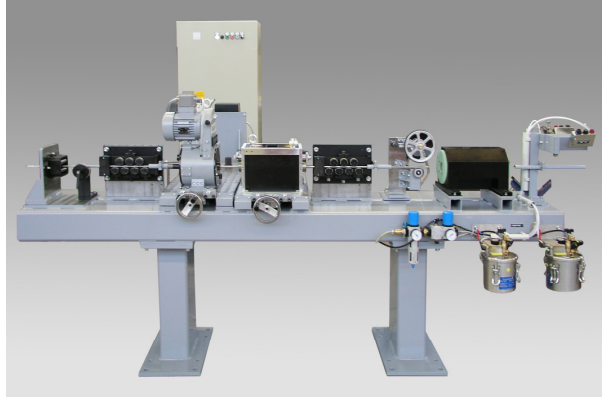
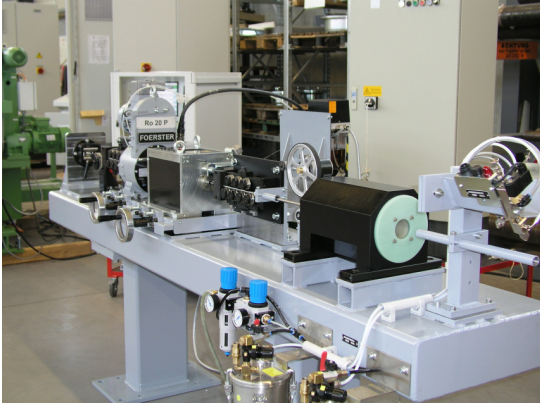
## Typical Transverse Defect Reference Calibration Standard of 1mm Dia. Drilled Holes.



## Typical Longitudinal Defect Reference Calibration Standard having Axial Notches.



## Test Section



## Handling Systems

