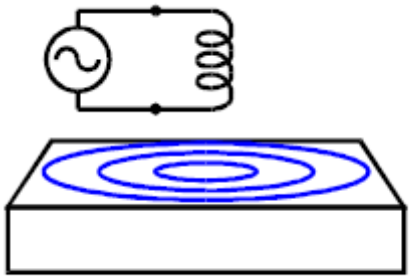
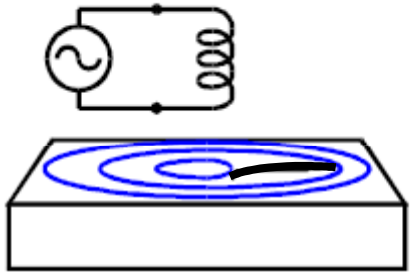
Surface Crack Detection using the Sperry Rail Eddy Current System

Principles of Eddy Current Inspection

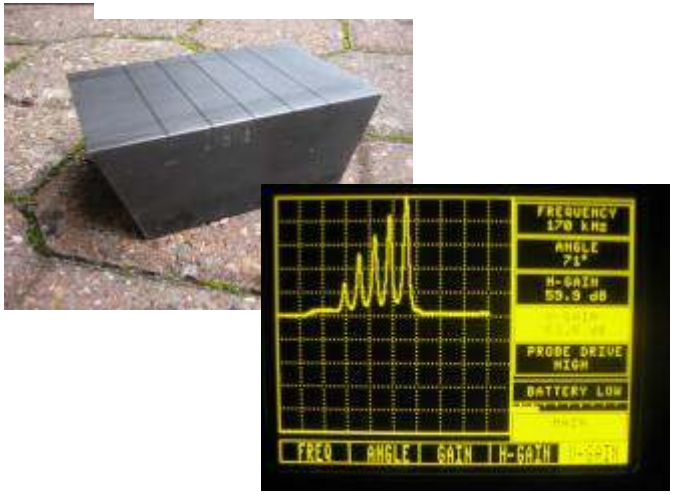
A coil with an ac current generates circulating currents in the rail head. The combination of the coil and rail has a measurable property called the impedance.



If there is a surface crack in the rail head this disrupts the currents in the rail head which causes the impedance of the coil and rail head to change. We measure any changes as the coil moves along the rail and so can detect where a crack is present



The change in impedance is proportional to crack depth for cracks up to about 2.5mm deep. This means we can use a steel block or piece of rail with artificial cracks of known depth to calibrate the system. The picture shows a calibration block with five artificial cracks from 0.5 to 2.5mm deep and the response from the system as it passes over them



Sperry Rail Eddy Current RSU

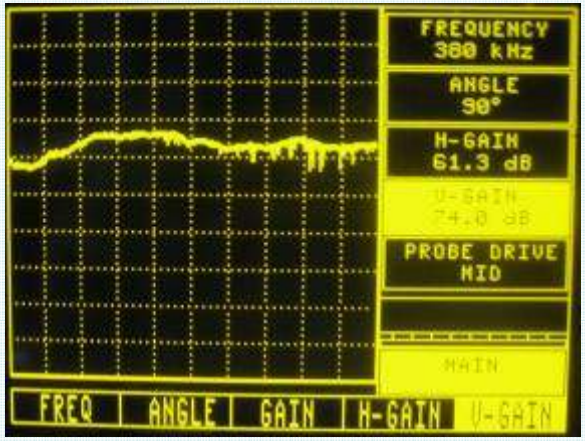
Inside

Outside

10 Channel Eddy Current RSU

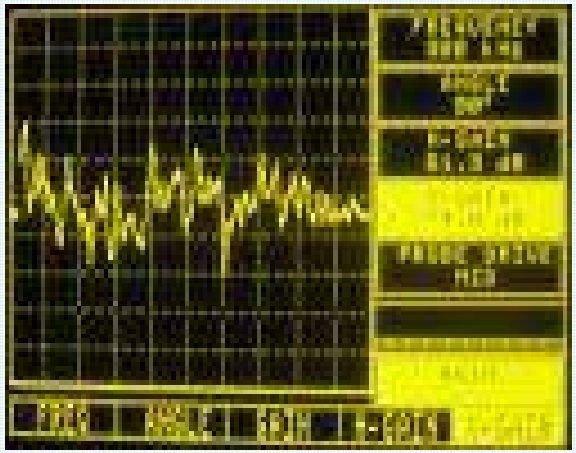
Calibration and Crack Detection

Calibration
Linearity



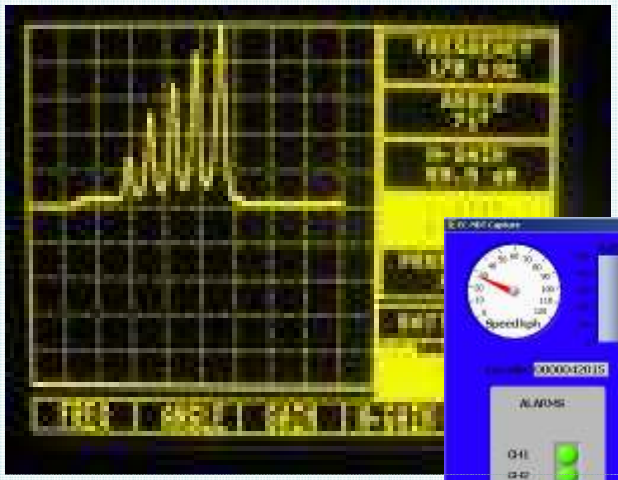
No RCF
Present

RCF
Present

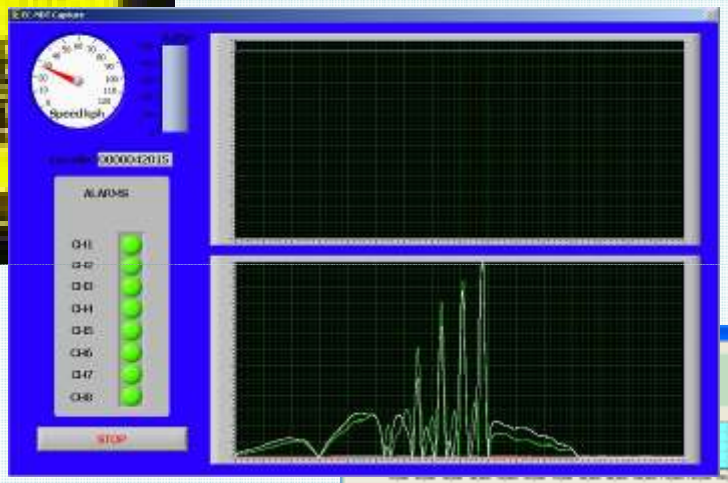


Eddy Current Raw Output

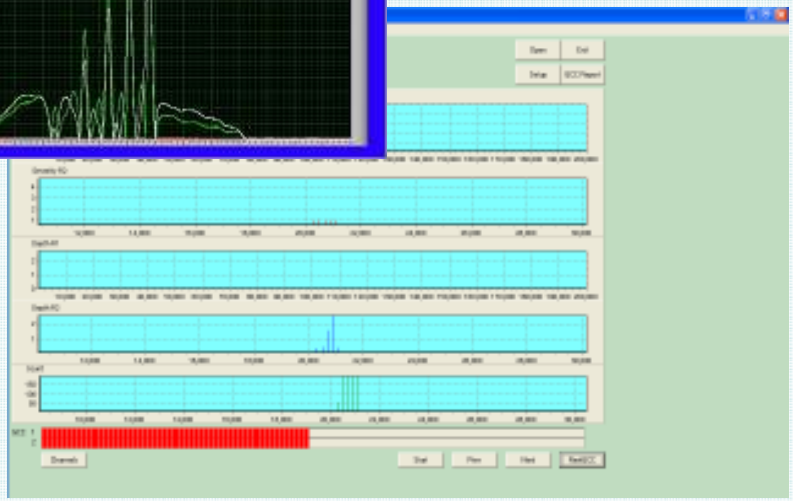
Real Time and Reporter Output



Raw
Output



Real Time
Output



RCF
Reporter

Eddy Current Data Output