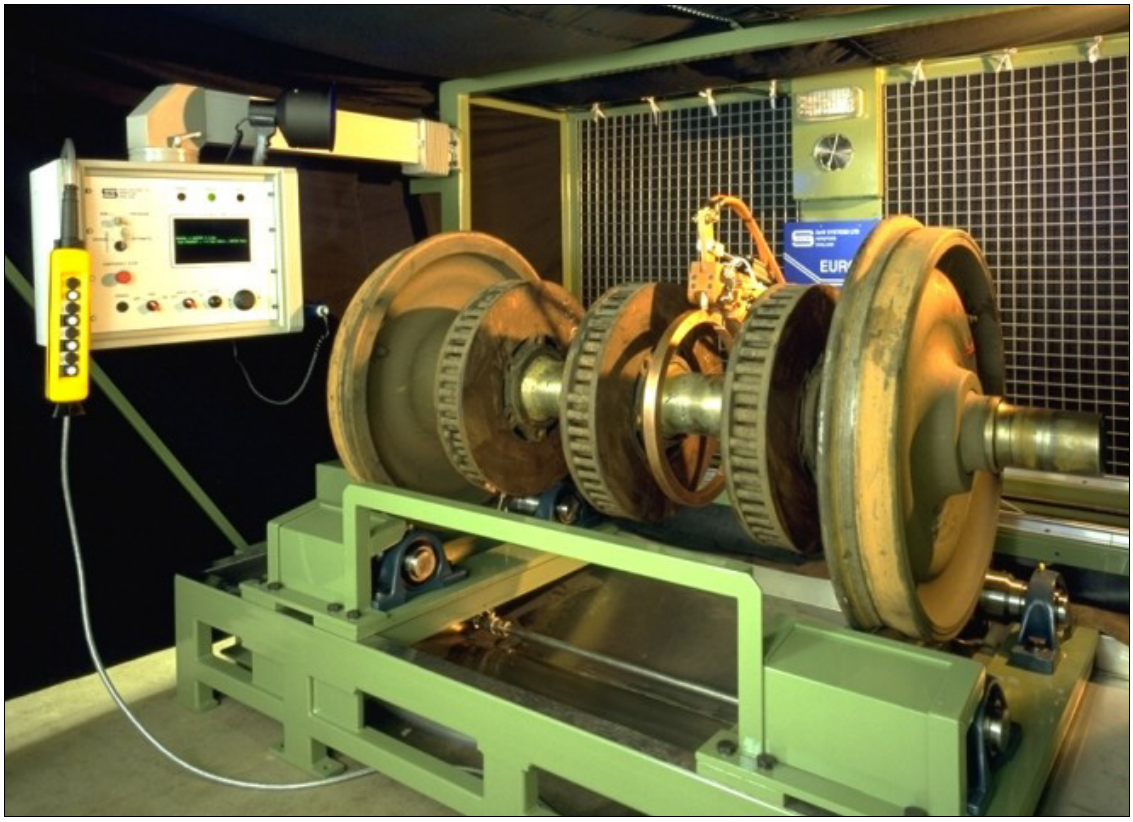
MAGNETIC PARTICLE INSPECTION OF RAILWAY WHEELSETS



Railway axles which have been in service are routinely tested for surface breaking cracks. One method of testing is the highly sensitive Magnetic Particle Inspection technique which detects any fatigue cracks on the axle. See the reverse of this brochure.

Detection of circumferential cracks on the wheelset axle.

Uses a single turn split coil to allow easy access between brake discs.

Positioning of coil along the axle is automatic, initiated by push button.

Pendant mounted controls for easy use.

Magnetising field strength up to 2400 Amps/Metre.

Programmable coil positioning to allow easy set-up for different axles, with different disc positions.

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The machine has two novel features. One is the magnetising procedure and the other is the programmable control system.

Since the axle is fitted with wheels and, possibly, other components the use of a continuous rigid coil is not appropriate because the wheels etc will not permit manipulation of the coil to the relevant position. However a hinged split coil will allow traversing along the axle to the required test positions, opening and withdrawing to avoid the fitted components. Therefore the position of coil can be adjusted to any accessible location on the axle including outside of the wheels.

On some axle types fittings such as brake discs are positioned closely together restricting accessibility.

This problem is overcome by the use of a single turn 35mm x 35mm solid copper coil. Whilst this solution might appear to be unorthodox, provided the ampere-turns necessary to magnetise the axle sufficiently can be achieved with a single turn, there is no advantage to multi-turn coils. In this instance up to 4500 amps AC R.M.S. is passed through the single turn giving 4500 ampere-turns. This would induce an applied magnetic field of approximately 2400 A/M giving the required flux density of 0.72 Tesla.

The positioning of the coil along the axle is by press button switches on a pendant. Through these is controlled the traverse of the coil support carriage, via a rotating lead screw, driving the coil carriage in lateral forward or reverse direction. Press buttons also advance and close the coil and open and retract it. The operator can therefore adjust the coil position and apply it to the axle visually. Safe guards prevent movement of the coil carriage when the coil encircles the axle.

The pendant control also has press buttons for rotation of the wheelset in the forward or reverse direction either with the coil in position or when retracted. This facility permits viewing of the surfaces for defect indications following magnetising and inking.

The other novel feature is programmability of the coil position. The standard Euromag microprocessor based control system allows the selection and adjustment of the following magnetising parameters by interactive display system by means of a single rotary control and enter button in the interactive display system. Magnetising Current waveform, No. of amps required, Magnetising Mode (current flow, encircling coil etc) duration of "shot" and no. of "shots". Adjustment of the value of the option selected is done by the same rotary control. The system display leads the operator through the selection and adjustment procedure by menu displayed on the screen.

The value of the magnetising current is pre-selected, in that the current to be applied to a particular mode is "entered" before magnetising takes place. The system automatically adjusts to the current to the preset value regardless of conditions.
Once a set of parameters has been set it can be stored within the system as a programme. Up to 100 such programmes can be stored. Additional programmes can be held on P.C. disc.

Making use of the above facility the soft-ware has been augmented so that not only can the magnetising parameters required for each axle type be stored and activated when required, but also the magnetising coil positions can be stored as part of the axle type programme.

This facility therefore will permit the composition of the programme, identified by a simple numeric code, for a particular wheel set type which not only sets up the equipment with the appropriate magnetising parameters but also the pre-set correct positions for the magnetising coil.

High amperage current is supplied to the magnetising coil from a separate power pack. The output from the main transformer is infinitely variable and is regulated by thyristor controlled by the system. The system also provides rapid demagnetisation from a value of magnetising current plus 10%.

The indicating medium, which is stored in the drain tray/reservoir, is continuously recirculated to maintain the particles in the correct suspension in the fluid. Application of the fluid to the axle is by hand held hose.

The equipment is supplied with a canopy to allow the inspection of the axles for ultra-violet fluorescent indications in subdued light. The canopy folds to allow wheelsets to be loaded from over-head.