1.2.19. THE APPLICATION OF EDDY CURRENT SECTION IN AUTOMATED SYSTEM FOR COMBINED RAILWAY ROLLING STOCK AXLES INSPECTION

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Two non-destructive methods are needed for detection of the flaw in railway rolling stock axles during production: one for detection of subsurface flaws and second for detection of surface breaking flaws. For first task the ultrasonic method satisfy all demands for sensitivity and resolution without any competition. For second task the magnetic particle method usually are applied. But this method has many disadvantages such as hard automatization of inspection operations and low productivity. Due these features magnetic particle method is the main reason of automated system productivity limitation in common. The main task for new inspection system development is the considerable increasing of inspection productivity to synchronize inspection procedures with productivity of plant production line. The possibility to replace the magnetic particle method by application of new eddy current (EC) probes with multi-differential coil connection was determined in our earlier investigation. Two types of special EC probes with needed sensitivity and spatial resolution for different inspection zones were developed: the Leotest MDF 0701 type EC probe with 7 mm diameter for cylindrical and face surfaces inspection and the Leotest MDF 0601 type EC probe with 6 mm diameter for small radius fillet surfaces inspection. The sensitivity was confirmed by application of reference standards (RS) made from axles steel. The artificial 15 mm length longitudinal and 50 mm length transverse like crack flaws were fabricated in RS. The depth and width of artificial flaws were 0.5 and 0.02 mm correspondently. The important features of developed EC probes especially for creation of automated inspection system are good lift-off suppression and high sensitivity with 0.2 – 0.4 mm gap between tested surface and probes.

The developed eddy current section provides computerized 32-channel inspection with 32 EC probes simultaneously. For better noise suppression and simplifying the EC signal interpretation additional filtering signal processing by differential summation of signal samplings was applied. The test investigations of developed system confirm that EC method optimally complement the ultrasonic method during the automated axles inspection.