

# **Nondestructive Evaluation Techniques for Railway Systems and Components**

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With the introduction of high-speed trains, the issue of safety for railway vehicles and railway systems is becoming increasingly important due to the speed-up of railway vehicles. Therefore, securing safety for railway parts and railway systems is an important factor. In order to secure the reliability of wheelsets, bogies, and electric devices, which are the core parts of rolling stock, various types of nondestructive evaluation techniques are also used in the railway field for maintenance. This paper introduces the nondestructive evaluation technology applied to the railway industry, and introduces the research activities to date. In the field of railway, various technologies such as ultrasonic testing, magnetic particle testing, radiography and infrared thermal imaging, etc., have been used. Ultrasonic flaw detection is one of the most commonly used nondestructive inspection techniques, and is widely used for flaw detection of rails, flaw inspection of weldments in railway vehicle bogies, and flaw inspection of wheels and axles. In the case of radiography technology, it is the most reliable technology to assess defects, and is steadily used in the railway field. In particular, infrared thermal imaging technology is a relatively new technology, and provides information on anomalous heat generation by detecting a temperature change on a surface of object. It is used for deterioration of braking discs and mechanical testing of railway parts. In addition, it is used as a nondestructive evaluation technology to provide information on abnormal conditions existing inside the railway parts. This study introduced the current status of application of nondestructive evaluation technology for various railway parts, such as electric devices, braking systems, bogies, rails, etc., and also described the advantages and disadvantages of each technology. Ultimately, the utilization and future prospects of nondestructive testing technology in the railway field will be mentioned.