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Abstract

24th IERE General Meeting and PLN Indonesia Forum
November 19–22, 2024

Destructive Evaluation Method for Thermal Power Plant Components Using Latest Material Technologies

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Keywords: Remaining life diagnosis, Destructive evaluation method, Miniature testing, Creep, Grade 91 steel

Abstract
In an era of large-scale introduction of renewable energies, it is expected that the construction of new thermal power plants will become even more difficult; and therefore, existing thermal power plants will be used for a long time. To safely operate power plants that have been operated for a long time, it is necessary to diagnose components of thermal power plants with a higher accuracy than before. The destructive evaluation method is one of the remaining life assessment methods, and it can achieve a higher diagnostic accuracy than other remaining life assessment methods such as analytical evaluation and nondestructive evaluation methods. However, it has rarely been applied to actual components because it is necessary to resolve certain issues such as a processing technology to take samples without damaging the equipment, a destructive testing technology for miniature samples, and an evaluation technology from limited test data, which are not necessary when applying destructive evaluation methods to test pieces in a laboratory. Therefore, we have conducted material research from various perspectives to resolve these issues and developed technologies for each of them on the basis of research results. Several verification tests on the application of the destructive evaluation method to components in actual plants were carried out, all of which were completed successfully. Currently, power companies have been requesting us to conduct the remaining creep life assessment of Grade 91 steel piping in ultra-supercritical power plants using the destructive evaluation method. In this presentation, an overview of the destructive evaluation method and its core parts, namely, ultra miniature creep testing technology and reference curve-assisted life evaluation technology, are described.