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Checking power plant components in a more targeted manner

Adjusting inspections to the actual load

In future, conventional power plants based on coal and natural gas will have to work much more flexibly than was previously the case. One reason is that they work in close conjunction with power fed into the electricity grid from renewable energies, which means that the power plants run more often under partial load. This imposes greater stresses on the components and in a different manner than they were originally designed for. The new BINE-Projektinfo brochure entitled "Material loading in flexible power plants" (01/2018) presents a new concept for investigating and evaluating power plants with varying loads. This enables operators and monitoring institutions to calculate the stability of components in terms of their damage more accurately and without compromising on safety.

Until now, conventional power plants were designed for full-load operation with constant pressure and temperature conditions. However, if in future it is intended that they should only produce the electricity requirement not covered by renewables, this will require a new, flexible mode of operation. For all components, this means more part loads, more start-up and shut-down cycles, and more extreme and rapid temperature changes. Scientists have therefore studied the loads on thick-walled power plant components under cyclic temperature changes. They have developed and tested a new method for conducting fracture mechanics-based analyses of the damage tolerance. The findings were also incorporated into a draft guideline for the fracture mechanics-based concept, which is currently in the validation phase.

The results are important for the business calculations made by power plant operators because the more frequent partial load operation causes not only higher maintenance costs but also reduced revenue from electricity sales than under full-load operation. TÜV Nord carried out the research project together with the University of Rostock and Research Centre Jülich.

The BINE-Projektinfo brochure, which can be obtained free of charge from the BINE Information Service at FIZ Karlsruhe, is available online at www.bine.info or by calling +49 (0)228 92379-0. The brochure cover and additional image material can also be downloaded from this web portal in the press section.

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