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Continuous optimization through adaptive boiler cleaning using Shock Pulse Generators

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In thermal power plants, heat recovery boilers, smelting plants, coking plants and metallurgical plants, efficient boiler cleaning is required to achieve long operating times with high efficiency levels despite the comparatively difficult fuels. Regular cleaning of the boiler surfaces prevents excessive deposits of flue dust from impairing heat transfer.

Various traditional technologies are used for boiler cleaning. These differ in their operating principle, the cleaning media used (water, air, steam, mechanical energy input) and the type of installation.

Using Shock Pulse Generators, the boiler is cleaned by an impulse of pressure waves triggered by the sudden combustion of small quantities of a mixture of a combustible gas (natural gas or methane) and an oxidation medium. In contrast to manual methods applying the same principle of action (e.g. blast cleaning with inflatable balloons, detonating cords or cartridges), the Shock Pulse of SPGs is triggered automatically whereby an instant incineration of the mixture takes place in a stable, pressure-resistant device outside of the boiler. The generated pressure wave is directed via a valve and a discharge nozzle into the boiler, where it vibrates the flue gas, the boiler tubes and walls in such a way that the deposits are cleaned off. Due to the spherical spread of the shock pulse, the cleaning is effective in all directions and reaches even the shaded areas of tube bundles. This enables gentle cleaning of boiler heating surfaces in all temperature ranges from the furnace to the economizer, without increased mechanical stress on the heating surfaces.

Furthermore, Explosion Power has developed a procedure in which the first step is to create a digital boiler model based on the P&I diagrams and plant data. This model is used to form the process engineering correlations between the measured values involved, derive the required parameters (e.g. load and/or temperature-adjusted flue gas pressure losses) and assess the significance of the measurements (incorrect or mismatched measurements, balance differences, etc.).

Links:

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