

4. Development of Smokestack Internal Repair System for High Temperature Range - Component Experiment and Demonstration Experiment with an Actual Smokestack -

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The firebrick layer of a reinforced concrete smokestack comes into direct contact with hot air and exhaust fumes and is prone to various forms of damage, including cracks in brick joints and missing bricks. Typical methods for repairing the brick layer requires facilities to cease operation for extended periods. For cases in which a stop-gap solution is required, we have developed a spraying system for repairing degraded firebricks without requiring the facility to shut down.

The newly developed system consists of a sprayer, spraying material, power supply, wireless communications device, and other components housed in a heat-resistant container. The container is lifted with a crane into the smokestack from above; the system performs spraying while moving up and down in the smokestack. Since this system must withstand high temperatures (around 200 °C), we carried out component tests of the spraying mechanism, thermal insulation and cooling system, remote monitoring system, communications device, and other components to determine the appropriate specifications. We verified the mechanical performance of the spraying material in the high temperature range.

We conducted a demonstration experiment of the completed repair system using an actual smokestack (40 m in height) temporarily removed from service. The results confirmed that assembling and disassembling the system on site and performing repairs via wirelessly remote controlled spraying posed no issues.

Key words: High temperature range, smokestack repairs, firebrick, dry spraying