

Whole term

1992.10 ~ 1994.3

(Purpose)

Osaka Northeast ACE Center adopts the coke bed melting process.

Operation progresses satisfactorily after the installation of the melting facility and the performance is stable. However, the cost of coke, which is the heat source of the melting process, is the highest among the expense items, occupying 45% of the total operation cost.

Therefore, methods to decrease the operation cost were discussed considering the characteristics of the coke bed method. As a result, it was considered to be efficient to supply utmost dried sludge and utilize the heat retained by the sludge.

Accordingly, the furnace was redesigned to utilize the sludge heat directly in it (powdered sludge blow-in style) within two years from 1992 to 1993. And pilot experiments were conducted to examine the performance and improvement of economy in accordance with the decrease of coke consumption.

(Results)

Pilot experiments were conducted using the melting facilities of Osaka Northeast ACE Center (10t-DS/day) in 1993 on the basis of the last year data in order to examine economy, amount of exhaust gas, concentration of scattered dust, material and heat balance, stability of operation, handling of over-dried sludge, items of the environmental impact. Moreover, a system introducing the process was designed on the basis of the experiment results.

1) Economy

Coke ratio (required cokes amount (kg) for the treatment of 1 ton dried sludge) decreased with the increase of sludge amount. And the amount of the sludge processed in the pilot experiments was approximately 500kg-DS/h (12 tons-DS/day), which was 1.2 times more efficient at the maximum than the existing plants.

2) Amount of exhaust gas

It was confirmed that the amount of exhaust gas per unit sludge (DS) in the pilot experiments was reduced to approximately 80 ~ 85% compared to the past operation records of the existing furnaces.

3) Amount of dust

The concentrations of scattered dust were almost the same as those of the existing furnaces.

4) Material and heat balance

The amount of steam heat consumption of the newly installed drying machine was less than 10% of the total steam heat generation. Drying of sludge was possible using surplus steam heat which was not used efficiently in the existing process.

5) Stability of operation

Continuous operation period was almost the same as that of the existing furnaces.

6) Handling of over-dried sludge

Supplied sludge was dried until at the moisture content of 5%, which was almost at fully dried state. Therefore, there was a risk of ignition during the drying process. However, it was possible to operate safely by supplying low oxygen content gas (recycled exhaust gas, O₂ concentration of 6-8%) and keeping the oxygen concentration below 15% in the drying circulation gas.

7) Items of environmental impact

The concentrations of dust, NO_x, SO_x and HCl in the exhausted gas were at the same levels as the existing furnaces. BOD, Hg and Zn in wastewater were also at the same levels as the existing furnaces. In the slag leaching tests, all the items of the performance tests for the mixed sludge (lime and polymer sludge) and the polymer sludge were below the detection limits, confirming the harmlessness to the environment.

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Keywords

regional sludge treatment, cokes bed method, cokes ratio, powdered sludge blow-in style