

Abstract:

JFE Engineering has constructed and supplied a large number of waste treatment facilities for over 30 years. To meet the recent demands for utilizing inorganic constituents of waste by melting, various types of melting systems have been developed and supplied to the market. For the requirement of direct melting of waste, two types of systems are offered: a gasifying and melting system called JFE High-Temperature Gasifying and Direct Melting System, respectively. In addition a unique hybrid system of waste incineration and ash melting furnaces being directly connected, called JFE Hyper 21 Stoker System, has been newly developed. Also, two types of individual ash melting systems heated either by electric resistance or plasma are lined up as products.

advanced stoker firing system integrated with ash melt-

1. Introduction

Creation of a recycling-oriented society has become an important issue not only in Japan, but worldwide.

JFE Engineering has built up its business as a constructor of waste treatment plants for more than 30 years, pursuing an optimal balance of safe treatment, cost reduction, and the recycling of materials and energy from the waste. Over the decades the company has garnered a rich and diverse track record in the engineering and construction of waste combustion systems, gasifying and melting systems, ash melting systems, material recovery systems, and more.

This paper reports the features of two representative waste melting systems developed by JFE Engineering: a gasifying and melting system (the JFE High-Temperature Gasifying and Direct Melting System) and an

gies, such as the two-way gas flow type incinerator and a hybrid ACC (automatic combustion control) system, with new technologies such as a fuel gas re-circulation system, a JFE water-cooled HYPER grate, and an integrated ash treatment system. The construction track record is shown in **Table 2**.

4.1.2 Features of JFE Hyper 21 Stoker System

This system has three important features:

- (1) The low excess-air combustion reduces the exhaust gas volume and improves the waste heat recovery rate.
- (2) High-calorific refuse can be processed and the grate

life is extended by the use of a water-cooled grate.

- (3) A compact ash treatment system is incorporated with a stoker furnace.

Figure 4 shows a system configuration of the JFE hyper 21 stoker system. **Figure 5** is a structural diagram of the furnace.

In this stoker system, a mixture consisting of a high-temperature air and exhaust gas is blown into the combustion-ignited zone of a JFE two-way gas flow type incinerator at a high speed from both sidewalls. This realizes stable combustion under a lower excess-air condition incapable of being achieved in conventional stoker furnaces. The system sharply reduces the NO_x concentration and concentrations of dioxins at the same time.

Because the system integrates an incinerator and an ash treatment furnace, bottom ash generated from the incinerator can be directly charged into the ash treatment furnace without any complex pretreatment equipment. Furthermore, because the fuel gas of the ash treatment furnace is led to the boiler and fuel gas treatment equipment connected to the system, the

from more than 30 years of constructing and operating municipal solid waste incineration facilities, also with its ample experience in manufacturing and operating electric furnaces for steelmaking, JFE Engineering offers ash melting furnaces that are capable of detoxifying municipal solid waste incineration ash, reducing ash volume, and recycling resources from the processed materials.

JFE Engineering has commercialized two types of ash melting furnaces, the electric resistance type and the plasma type, as electric furnaces for ash melting capable of yielding high-quality slag and operating with small environmental burden.

The development of the electric resistance type ash melting furnace commenced with fundamental experiments in 1991, followed by the construction of a

commercial-scale pilot plant with a capacity of 24 t/d in 1995⁶). At present, five plants (eight furnaces) have been supplied and another two (three furnaces) are now under construction.

The development of the plasma type ash-melting furnace has been started with a fundamental experiment in 1987, followed by the construction of a test demonstration plant in 1993. Since then three plants (four furnaces) have been constructed⁷).

6. Concluding Remark

This paper described the melting systems in the waste treatment systems developed by JFE Engineering. JFE Engineering offers a lineup of optimal waste treatment systems suited to the requirements of customers. Henceforth we will continue to engineer technologies to save resources from waste and to help achieve a recycling-oriented society.

References

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