OVERVIEW

Municipal waste incinerator fly ashes and (to a lesser degree) bottom ashes contain leachable levels of heavy metals, including lead, chromium, arsenic, cadmium and zinc. In addition, these ashes can also contain Persistent Organic Pollutants (POPs) such as dioxins and furans that are generated in the incineration process. Environmental regulations in Japan require that the bottom and fly ash produced in the incineration of municipal wastes must be vitrified.

Mitsubishi Heavy Industries (MHI) are a leading supplier of energy from waste/incinerator plants in Japan and South East Asia and required an efficient technology to vitrify the volume of fly ashes they were generating.

THE SOLUTION

Tetronics has developed a high temperature thermal process for the treatment of incinerator ash materials that produces a dense, mechanically strong vitrified material (Plasmarok®) that is environmentally inert and can be used as an aggregate in the construction industry. The system developed for MHI employs a single DC plasma arc melter. The process was extensively pilot tested in the UK during the early 1990’s and subsequently at MHI’s demonstration facility at Yokahama City.

“*The Iwaki City incinerator rated at 390 TPD, generates around 40TPD combined fly ashes and grate ashes that are treated in the plasma furnace.*”

Following successful demonstration, the Iwaki City plant located 90 km North East of Tokyo was the first commercial system that was installed by MHI. Since that time, a total of 8 commercial vitrification facilities that employ Tetronics’ technology up to a maximum rate of 2x 80TPD have been commissioned by MHI.
ABOUT TETRONICS’ FLY ASH SOLUTION

High temperature plasma arcs are heat sources of intense power and versatility, combining the chemically inert heat of a plasma arc with the stability and control traditionally found with a gas flame. Tetronics uses its plasma arc heat sources to melt, gasify or vaporise fly ash to treat, recover and generate valuable commercial products. As the heat source is electrical, the plasma arc treatment technology does not involve any form of direct combustion or incineration. These factors make plasma an essential component of future sustainable Fly Ash waste management infrastructure.

MHI PROCESS DESCRIPTION

The plasma vitrification furnaces used at MHI are vertical cylindrical refractory lined vessels that are heated by a single plasma arc. The return electrical path is via an electrode built into the furnace hearth. The ash is fed at a controlled rate through transferred screw conveyors that discharge through the sidewall of the unit. The plasma power to the furnace is closely modulated to match the feed rate of the ash, to maintain a melt temperature in the range 1400-1500°C. The slag continuously overflows from the furnace and is slow cooled in a slag conveyor system prior to discharge to a storage hopper.

ABOUT TETRONICS INTERNATIONAL

Tetronics International is the global leader in the supply of Direct Current (DC) plasma arc systems for a wide range of Hazardous Waste Treatment applications. Our plasma solutions are perfectly suited to treat a range of hazardous waste streams, including: Fly Ash and Air Pollution Control residue (APC), Organics, Spent Potliner, Asbestos, Radioactive Wastes, Oily Sludges and Chemical and Biological warfare agents and precursors.

Our capabilities encompass everything from initial modelling/feasibility assessment, pilot testing of the process material, through to design, supply onsite installation/commissioning and on-going support of full commercial plants. Tetronics’ track record in advanced environmental waste treatment and material recovery processes for a range of toxic, hazardous/industrial wastes, as well as other resource-rich streams, has resulted in more than 90 installations across a wide and varied range of applications.