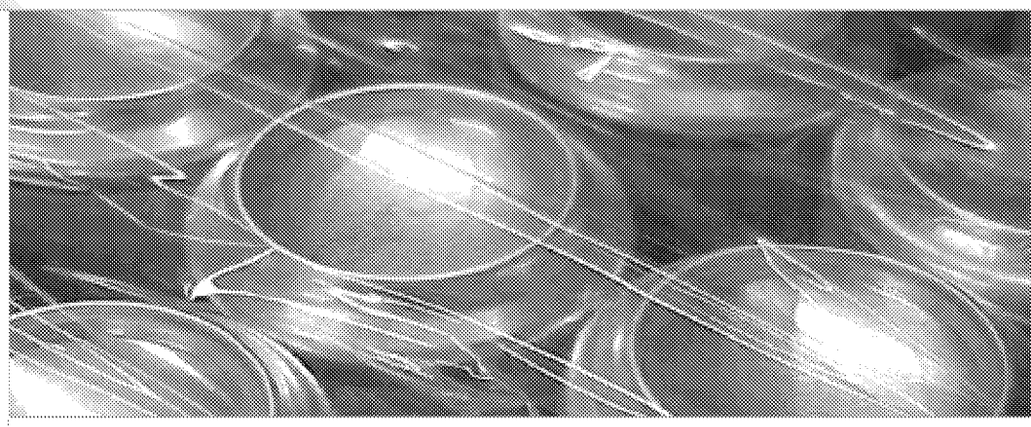
Tetronics International

Tetronics: Treatment of Aluminium Spent Potliner Waste

Tetronics Benefits:

- Safe 'future proof' treatment of a problematic orphan waste material
- Gasification of carbonaceous components, which greatly reduces the mass and volume of the waste stream, with the potential to generate a synthesis gas (a fuel) or steam
- Robust technology that is tolerant of a fluorine rich environment
- Vitrification of the inorganic fraction to produce a dense, environmentally stable Plasmarok®*
- Fluorine recovery and recycling
- An intensive, compact process plant package that can be readily retrofitted to existing installations
- Control of power input independently of process chemistry



Treatment of Spent Potliner waste using Tetronics' technology offers commercial and technical advantage over existing waste management options while conserving natural resources.

About Tetronics:

Tetronics International is the global leader in the supply of Waste Recovery Plants. We have the capability to manage the complete deployment lifecycle of a Waste Recovery Plant from initial testing of the waste material at Tetronics' test facility, the most comprehensive in Europe, through to the physical onsite installation of a full commercial plant, and subsequent support and maintenance.

Tetronics' patented Direct Current (DC) Plasma Arc plant technology provides the closest solution to Zero Waste currently available. This "green" sustainable alternative for waste management uses ultra-high temperatures to melt, gasify or vaporise any waste material, in order to treat, recover or generate useful commercial products.

As a pioneer in using plasma technology for waste treatment, our multi-faceted, highly qualified research and engineering team have applied the technology to an unrivalled range of waste challenges.

Our technology has been tried and tested over five decades and has been used globally in more than 80 plants across a wide and varied range of applications.

These applications include, but are not limited to: transforming hazardous waste into environmentally safe building aggregate, recovering precious metals from spent catalysts, recovering energy from waste oil, reducing the volume of radioactive materials and improving the quality and efficiency of steel production.

Our principal aim is to provide sustainable and future proof solutions to support organisations in recovering value from their waste materials while meeting their waste disposal carbon footprint challenges.

What is Spent Potliner (SPL):

SPL arises during the production of metallic aluminium following a complex series of industrial process. SPL is a contaminated graphite/ceramics cell lining waste generated from the production of primary aluminium. The most common aluminium ore, bauxite, is used as a source of alumina. This alumina is the feedstock for the smelting operation, i.e. aluminium metal production, where alumina is fluxed/dissolved with cryolite in large carbon or graphite lined steel electrolytic cells known as "pots". These pots operate continuously with an operating lifetime of typically 5-8 years.

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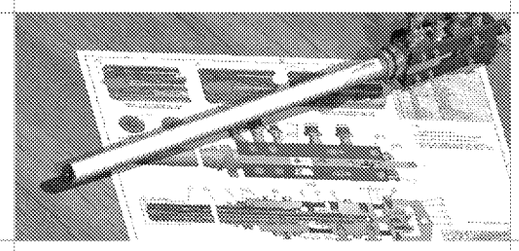

Spent Potliner Waste Challenges:

SPL disposal and reuse is a global challenge for the primary aluminium industry. SPL is a mixed hazardous waste that consists of carbonaceous materials (first cut) and refractories (second cut). It is removed from the electrolytic cells when they are relined at the end of their operational life. During a pot's operating life, various chemicals that are highly toxic, corrosive and water reactive form and/or accumulate in the cell lining.

World primary aluminium production was 23 million tonnes in 2009 with sustained growth predicted in the medium term. Demand for aluminium is increasing and this growth is currently expected to continue for the foreseeable future. SPL waste is heterogeneous due to the range of bauxite sources and variants of technological origin and therefore a robust and versatile waste management solution is required. The production rate of SPL is ~22 kg SPL per tonne of primary aluminium produced, so the predicted global SPL market in 2009 was equal to 515 ktpy. Unit treatment costs in 2009 typically ranged from $400 - $1,200 per tonne of SPL; this wide cost range reflects economies of scale and the impacts of local conditions.

Safe disposal of SPL is an issue that challenges the global primary aluminium production sector. Currently, European SPL (EWC Number 161101) is an absolute hazardous waste material, as defined in the European Waste Catalogue (EWC). A similar situation prevails in North America where the EPA have category K088 (primary aluminium smelter waste).

How Tetronics can Help:

Tetronics offers Waste Recovery Plants to meet a growing number of waste management challenges including the recovery of pyrometallurgical wastes; one of the many potential waste streams is SPL. Tetronics has extensive experience and know-how in the characterisation and treatment of SPL. Some of this work has been undertaken in close collaboration with one of the world's largest aluminium producers, with an annual output of 4 million tonnes of aluminium.

How Tetronics' Technology Works:

In plasma-enhanced vitrification technology, SPL arisings are fed into a sealed furnace and heated in a controlled environment using the plasma arc created by single or multiple plasma electrodes. The process chemistry is designed to separate the valuable elements from the less valuable material which is then converted to a disposable vitrified product in a single processing step.

Contact Tetronics to find out how we can assist with your Spent Potliner challenge.

Tetronics' experience in the application of plasma technology has resulted in an enviable international reputation, not only for the quality of plasma systems but also for the depth of technical expertise.

Fichtner:
a leading engineering, project management and technical advisor to the waste management, process and renewable energy sectors.

*Plasmarok® is a dense, mechanically strong and environmentally benign product.

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Tetronics SPL Datasheet: Version 5, 19082013

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