

Disposal of waste wire drawing lubricants.

## Introduction

The formulation and properties of spent wire drawing powders is making their disposal increasingly more difficult. The combination of new legislation and environmental pressure means that producers of such wastes now have to seek new, innovative methods of disposal or recycling.

For instance, new landfill regulations do not permit the disposal of wastes that are both hazardous and biodegradable. Wire drawing powders fall into both categories due to the moderately high pH values and high level of biodegradable carbon from the fatty acids used in their formulation.

Landfilling also fails to take advantage of what could be considered a renewable fuel source - namely the fatty acids within the lubricants.

The fatty acids present in drawing soap have a similar calorific value to that of Diesel (46 MJ/Kg) and a higher value than Coal (38MJ/Kg). Additionally, as they are made from renewable feedstock they are deemed 'carbon neutral' when used for power generation; using these materials as a fuel rather than landfilling them reduces the waste producers' so-called 'carbon-footprint'.

## Prosper De Mulder

Legislation introduced in the wake of the BSE crisis in 1996 resulted in the introduction of major restrictions on the use of meat and bone meal and blood products. Traditionally these products were used in animal feeds but the new legislation brought this to an end; in effect products that had been high-value feed commodities became waste overnight.

In response to the challenges, the UK's leading animal waste rendering company (Prosper De Mulder – PDM Group) developed a new combustion system which utilised meat and bone meal for the generation of renewable energy. The system is based around a 'bubbling fluidised bed' combustion plant with steam recovery and power generation.

One of the major driving forces behind PDM Group's development of its Bubbling Fluidized Bed (BFB) technology has been the need to meet Government requirements for the effective destruction of animal proteins in the combustion process. The UK destruction standard is so strict that 100 grams of residual ash from the combustion process may contain only 5 milligrams of proteinaceous material - i.e. 500 parts per million (ppm).

Today PDM's renewable energy plants provide a safe, sustainable outlet for products such as drawing soap, meat and bone meal and biodegradable liquids; generating renewable energy from products which would otherwise be landfilled.

PDM kindly provided the process description below.

## **Introduction**

PDM Group was the first company in the world to develop a dedicated, commercial combustion process to use animal by-products and bio-fuels as a renewable fuel source.

Following many years of research and development, a pilot plant was commissioned at PDM Group's Hartshill, Nuneaton site in 1997. Based on the information and expertise gathered from the pilot plant, PDM Group opened the world's first commercial meat and bone meal (MBM) combustion plant at Widnes, Cheshire in 2000.

Today, PDM Group's bubbling fluidised bed (BFB) combined heat and power (CHP) combustion technology provides the benchmark for the disposal of meat industry residues.

PDM Group's Widnes site is an integrated renewable energy and recycling plant; the first of its kind in the world.

Combustion ash from the plants has to date been landfilled, however it has always been recognised that it's controlled physical and chemical properties make it suitable for a range of utilisation options. The recent clarification of regulatory requirements has enabled trials to proceed.

This document summarises the process by which the ash is produced, the regulatory requirements and environmental benefits, and lists the relevant ash properties.

## **Plant and Process Description**

The combustion process comprises a fluidised bed – a bed of inert particles agitated by combustion air – contained in a refractory lined vessel. Combustion takes place mainly in the fluidised bed and is completed in an above-bed region where additional air and liquids can be added for temperature and emissions control. Bio-fuels are fed to the combustors as wet slurry.

The hot flue gases from the combustor pass through a heat recovery boiler to produce steam for a turbine system generating electricity for use on site and for export to the National Grid.

The cooled flue gases are treated with a dry sorbent powder to remove acid gases and pass through a bag filter system to remove particulates before exhausting to atmosphere.



PDM fluidised bed combustion plant



The combustion plant at Widnes UK

Condat Ltd made an approach to PDM with the view to helping our customers with the disposal of spent wire drawing powders.

A sample of waste Sumac 2X was sent to PDM to evaluate the possibility of this being added to the animal waste streams for incineration.

The sample was tested and found to contain 22MJ per Kg of recoverable energy. An application was made to the Environment Agency for permission to combust this waste at the Widnes plant shown above, this was accepted and the waste given a coding of 16 03 05 – Organic wastes containing dangerous substances.

When meat and bone meal and blood is combusted in this plant the resulting ash contains mostly Calcium phosphate from the bone and Iron oxide from blood so this is fully compatible with any scale or metal fragments in the spent soap. Any other undesirable substances produced from incinerating spent wire drawing lubricants such as Boron etc are rendered non hazardous in the ash purely by massive dilution in the animal ash streams (PDM process several thousand tonnes per week of blood and bone)

PDM have already processed around 30 tonnes of waste Sumac 2X and are now installing powder-handling equipment to deal with larger volumes as we roll out this offer to our customers in the UK.

Calcium soaps have been evaluated and though less attractive due to a lower fatty acid content disposal of these materials will be offered in due course. Waste soap heavily contaminated with Zinc (drawing of Galvanised wires) has

also been evaluated and once again it is possible to process this material in just the same way.

The environment.

Burning spent wire-drawing lubricants makes use of otherwise wasted energy, diverts waste from landfill and is carbon neutral (carbon generated during the combustion process is absorbed by plants being grown at the start of the production cycle)

Animal and vegetable oils produce far less CO<sub>2</sub> than Diesel and Coal when burned and can be used as a renewable replacement for such allowing wire drawing companies to lower their Carbon footprint. If we take the case of Sumac, burning 1T would be the equivalent of ½ Tonne of Diesel and around 600Kg of Coal.

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