WRAP MDD023 WEEE Separation Techniques

Axion Recycling and the University of Nottingham

TITLE: Alternative dry separation techniques for WEEE

PROPOSERS

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TRIAL DATE: 9th - 31st March 2009

TRIAL ATTENDEES

Kwame Nkrumah-Amoako
Mike Bennett/Roger Morton
Dr. Philip Hall (Nottingham University)
Prof. Nick Miles (Nottingham University)

Sample description

Material	Size	Sample #	Composition
WEEE	sub 2.36 mm	1	Plastic (70%), Copper (1-5%), PVC coated wires (~5%), rubber (~10%), small quantities of glass, stone, wood, PCB's
	2.36 to 5.0mm	2	
	~12 mm (as off HC UF)	3	
ELV	sub 3.0 mm	4	Plastic, Copper, Stone and Glass, Other metals. Small quantities of wood, rubber, PVC coated wires, PCB's. Mass % may differ for each size class.
	3 to 8 mm	5	
	8 to 12 mm	6	

Samples 1, 2 and 3

Aim / Goal: To produce a pure copper fraction which has the potential to be sold. Market research indicates that the copper fraction will be saleable if it contains less than 5% combustible material. Glass and stone in the copper fraction do not create a major problem for smelters but plastic and other combustibles cause excessive gas flows in the furnace. Copper wires can range in shape and radius from PVC coated wires 50mm long and 4mm in diameter to really fine copper wires 5mm long by only 0.5mm in diameter. This can make the separation very difficult.

Work plan:

- 25 kg sample to be classified upon receipt - predominantly by size but also through heavy liquid analysis, and split by riffling to generate a number of representative sub-samples (3-5 kg). This will help establish the composition of the material so that the settings for the trial could be designed accordingly.
- These sub-samples of the "as received" feed materials will be treated in the experimental batch jig under various conditions (airflow rate, pulsation, etc) and the degree of separation recorded both quantitatively (recoveries) and qualitatively (images). Quantitative assessment will be based on heavy liquid analysis. Depending on product quality will determine whether further work is required to reduce the feed size to enhance liberation prior to jigging.
- Depending on the outcomes from the jigging experiments a limited programme of work may be conducted using the dry Vibration-Separation approach. Here the feed material has to be reduced to less than about 3 mm in size for the process to operate. One advantage of this is that at this size there is likely to be good liberation of the various components contained in the feed material.

Samples 4, 5 and 6

Aim / Goal: The aim with the ELV material is produce a stone/glass fraction, a metals fraction and a plastics fraction. An alternative would be a stone/glass fraction and a plastics fraction with the metals distributed across the two fractions. The stone/glass mixture needs to be fairly metal-free if it is to be diverted into low-grade aggregate end-uses (e.g. as trench-fill).

Work plan: Same as Samples 1, 2 and 3

Additional notes:

All trial works need to be completed by 31st March 2009.

The full trial samples will be as follows:

Sample shipping address:

Dr. Philip Hall
Department of Chemical & Environmental Engineering
University of Nottingham
Nottingham
NG7 2RD

Sampling / results to collect during the trial:

Small samples of the product streams should be taken during the trials with the remainder of the material being returned to:

(FAO: Kwame Nkrumah-Amoako)
Axion Polymers,
Langley Road South,
Salford,
Manchester,
M6 6HQ

During the trial photographs of the equipment and samples should be taken for use in the final report. Any important information which may assist with the analysis of the results should also be recorded including;

- Rig size
- Average throughput during the trial on each run
- Predicted throughput when the plant is scaled up
- Predicted power and air consumption of the machine when scaled up
- Critical factors that may affect the quality of separation