

Trial Plan - Holman Wilfley Wet Shaking Table

Trial host/location: Holman Wilfley, Cornwall

Trial date: 10th February 2009

Duration: 1 day

Attendees: Nicola Myles (Axion), Keith Freegard (Axion)

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Trial equipment: Wet shaking table

The wet shaking table is a separator which originates from the mineral processing industries but has also found uses in metal recycling. Holman Wilfley make two tables suitable for WEEE processing; the full size 7000 model which has a capacity of up to 1500kg/hr and the smaller 3000 model with a capacity of up to 800kg/hr. Both are said, by Holman Wilfley, to be suitable for a feed size of up to 8mm. The 7000 model can have a single, double deck or triple deck arrangement when floor space is limited. The tables can effectively recover copper from electrical cables and may prove a useful way for separating copper in general. They can also recover precious metals from low tonnage streams and electronic circuit boards.

The table is made with shallow longitudinal ridges running from one side to the other called 'riffles'. The table shakes and is fed with a stream of water running from the top corner to the diagonal bottom corner in order to create a layer of water running over the riffles. The angle of the table can be adjusted in two dimensions. The frequency and amplitude of the vibration can be varied along with the flow of water across the table. The separator therefore has a very large number of control options.

Material is fed onto the table in the top corner. Compact, dense particles fed on to the table are less likely to be swept over the riffles by the combination of the water flow and vibration than light particles or particles with a high surface area. The result is that the material stratifies on the table, separating it into different fractions which leave the table at different points.

The tables can be made with a stroke range of 10-17mm for finer particles or 17-35mm for coarser particles. The tilt of the table can be easily adjusted by the use of a hand wheel whilst the machine is operating.

Trial objectives: The overall objective is to separate valuable metals from glass, stone and plastic. The specific aim is to produce a high purity copper stream which has a saleable potential. The key to achieving an effective separation is likely to be the particle size and shape.

Market research with copper smelters indicates that the combustible component of the copper fraction must be reduced below 5% to make it attractive to the majority of copper smelters in Europe. A higher content of stone and glass can be tolerated as they are inert in the smelter. However separating copper from stone / glass increases the value of both

fractions. The stone/glass has no value when mixed and sold with copper but is saleable as a useful aggregate if it can be separated with a low copper content.

Sample material:

The following material will be trialled:

- a) PVC rich plastic fraction containing copper

Several different size ranges of the following material will be needed for the trial in order to test the effect of size distribution on the efficiency of the separation. Therefore the sample material will be processed as follows:

½ tonne of the copper rich plastic will be sent directly to Holman Wilfley. This will be split into three fractions. The first will be trialled on the table 'as it is'. The other two fractions will be granulated to 5mm and 2mm respectively by the granulator at Holman Wilfley.

A separate fraction will be hammer milled and this will be sent to Holman Wilfley to be trialled at the same time at the other samples. The intention is to hammer mill the material with SwissRTec. This process shall ball up the fine copper wire fraction and smash the glass without size reducing the plastics.

Sample shipping address:

SGS Minerals Services Europe,
Wheal Jane Mine,
Baldhu,
Truro,
Cornwall
TR3 6EE
United Kingdom

Trial procedure: Initially two small samples of material will be sent for pre-trial analysis. These are:

- 1) 10kg of copper rich PVC for wet shaking table
- 2) 10kg of mixed plastic (Axion grade PS07)

Holman Wilfley provided feedback on the samples prior to arranging a full scale trial.

The initial feedback from Holman Wilfley led to an adjustment of the plan. Holman Wilfley felt that the mixed plastic would not work on the wet shaking table either and suggested using different density solutions which is a route not being pursued in this project. Therefore processing of this material was also abandoned.

The copper rich plastic fraction was deemed suitable for processing.

- a) **Copper/plastic separation:** the aim of this trial is to separate the copper from the plastic. If necessary the copper rich fraction will be reprocessed to see if the purity can be improved. The trial will be conducted on the four different fractions of material.

Sampling/results to collect during the trial:

During the trial samples will be taken for later analysis at Axion in order to determine the success of the separations.

It is proposed that the following samples will need to be collected along with the fraction weights.

Trial	Input material sample	Product 1 sample	Product 2 sample	Input weight	Product 1 weight	Product 2 weight	System Set up
(a) Material 'as it is'							
(b) 2mm material							
(c) 5mm material							
(d) Hammer milled material							

If trials are repeated for different system set-ups and material size fractions extra rows can simply be added to the table to record this.

Both input and output samples will be analysed at Axion's lab in order to determine composition of the samples.

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

Axion Polymers,
Langley Road South,
Salford,
Manchester,
M6 6HQ

Photographs of the trial equipment and samples should be taken for use in the final report. Any important information, for example equipment parameters, which will assist with the analysis of the results should also be recorded.