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E-waste activities at Mintek

WEEE Industry-meets-Science workshop
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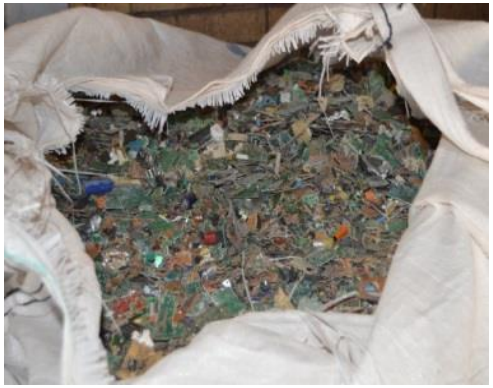
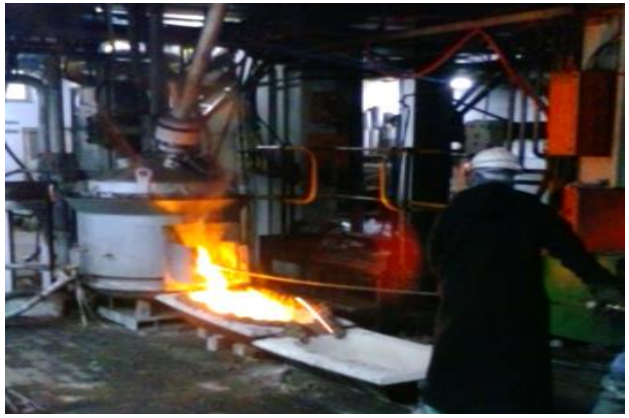
Overview of current WEEE activities

1. Evaluation and development of pyrometallurgical technologies for the treatment of printed circuit boards (PCBs)

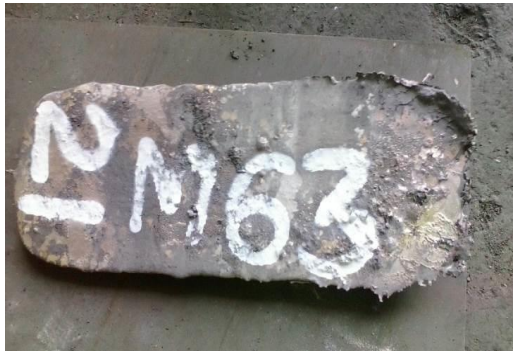


PCBs

Shredder



200kVA DC furnace



Alloy

Hydrometallurgical metal recovery

- **Furnace and off-gas system design and cost analysis**
- **Economy of scale**

Overview of current WEEE activities

2. Evaluation of hydrometallurgical technologies for the treatment of printed circuit boards (PCBs)

- Development of analytical and mineralogical methods to analyse heterogenous e-waste fractions
- Pre-sorting
- Leaching of the PCBs
- Recovery of metals
- Desktop cost estimate
- Design of modular/mobile units

3. Data collection – quantify the amount of PCBs that are potentially available for recycling

- Gauteng, Western Cape and Kwazulu Natal
- Material Flow Analysis

Critical for MFA

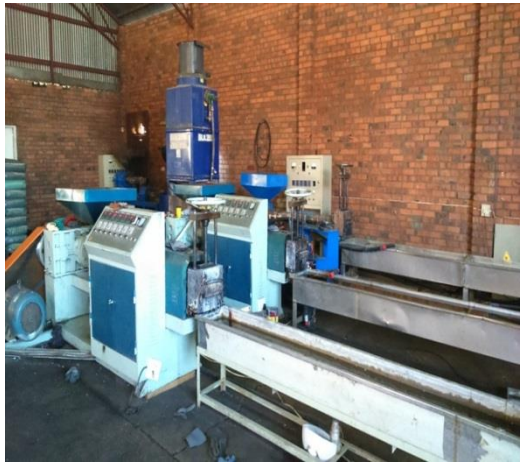
Dependent on habits & success of Stage 1 & 2

Stage 1: Generation → **Stage 2: Collection** → **Stage 3: Pre-processing** → **Stage 4: Processing** → **Stage 5: Disposal**

Overview of current WEEE activities

4. **Technology for recycling of e-waste plastics**

- Equipment to granulate, pelletize the plastic
- Produce prototypes e.g. roof tiles, bins, fence poles, gutters
- Market survey to identify potential opportunities
- Transfer knowledge to small business – training , collaboration



Extrusion plant

5. Partner in the H2020 funded project: E-waste Implementation Toolkit (EWIT)

- SA partners include CSIR, eWASA, Pikitup and Mintek
- European-African cooperation initiative aimed at implementation of a web-based e-waste toolkit
- The toolkit will be an easy-to-use information and service portal that will give guidance and practical support to policy makers for the design and development of smart e-waste collection and recycling systems.

Obstacles to WEEE recycling

- Low collection rates
- Insufficient drop-off points/accessibility of collection points
- No separation of e-waste from other solid waste streams at source
- Low public awareness of the need to responsibly reduce, reuse and recycle. Emotional attachment to equipment
- Infrastructure and technology constraints
- Financing of recycling: High cost, low margin business
- Commercially viable e-waste processing may require significantly higher volumes of feedstock in order to be profitable
- Large scale recycling companies derive the bulk of their earnings from the sale of ferrous and non-ferrous metal fractions - deliveries of these e-waste fractions and payment turnaround times are quicker than for PCBs that are exported
- Incentives for responsible treatment of problematic waste streams – CRTs, printer cartridges, refrigeration, CFLs

Opportunities for increasing WEEE recycling

- Depletion of near surface mineral resources a strong driver of growth of the recycling industry
- Synergies with existing mineral processing industry – sustainable outlets for secondary materials
- Government commitment and pending EPR scheme
- The e-waste sector has potential to become a significant job driver in the waste management industry – incorporating unskilled labour
- Quick obsolescence of EEE items, increase in e-waste growth (3x higher than municipal waste)
- Environmental concerns
- Increased collection of e-waste e.g. e-waste from government and businesses
- Emerging R&D capability to support development of technologies
- South Africa could become a regional treatment hub for the Southern African region

Current gaps in knowledge

- Developed e-waste data management system to understand the origins, pathways, immediate and final sinks of e-waste materials along the value chain.
- Lack of local technologies for e-waste recycling which are linked to end-use markets
- Processes for the cost-effective recovery of the metals after pyro- or hydrometallurgical treatment; metals often present at low concentrations
- Solutions for treatment of hazardous fractions such as CRT monitors, printer cartridges, refrigerants, batteries
- A financing system for negative value products - to avoid “cherry picking”

THANK YOU

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