SMALL TO MEDIUM SIZED LEAD ACID BATTERY RECYCLING PLANTS: TILTING ROTARY FURNACES AS REDUCTION UNITS

LABAT 2008
Varna Bulgaria
Lead Prices
- Economic motor
- Environmental legislation
- Desire to ‘survive’
- Increased number of in-house recycling units
- Dumping long gone
- Increased stewardship schemes
- LAB virtually closed loop
- In West concentration in hands of small number of large players
• Incentives for manufacturers to recycle in-house
Battery breaking and separation

- 97.5% of standard SLI battery is recyclable:
  - 36% Lead oxides
  - 29% Metallic lead (plates)
  - 5% Polypropylene
  - 27.5% electrolyte
  - 2.5% non-recyclable sterile (separators)
After removal of electrolyte, casing is crushed and different fractions separated by density.
Reduction / Smelting

- Obvious that after separation makes sense to keep metal streams separate: Metallic lead and lead oxides
- Reduction under slag
- Composed of
  - Carbon (anthracite)
  - Soda Ash
  - Cast iron chips
Smelting Options

‘Short Body’: \[ \text{Diameter} = \sim \text{Length} \]

Long Body:
\[ \text{Length} > \text{Diameter} \]
Short body advantages

- Creates a deep bath that affords:
  - Large charge capacity
  - Better ‘decantation’/separation of molten metal & slag
Disadvantages
Tilting Rotary Furnaces
What is a TRF?
Dross 900
Melting & casting position
stack side
• TRF gives a good deep bath for improved decantation and separation (like Short body)

• Ratio of total volume/useful volume much smaller
  - 2:1 as opposed to 4:1 for Short body

• Improved efficiencies

  • More compact design
Economics

- 6600 tonnes of batteries
- 4300 tonnes of lead
- Investment including:
  - Buildings
  - Crusher/seperator
  - Reduction furnace
  - Refining kettles & equipment
  - Filter
  - Operational personnel
    - 7 people per shift + supervisor
- Consummables
  - Gas & Electricity
  - Reagents
  - Maintenance and spares
• Small & Medium sized plants are a viable economic option
• For some it could be only option
• Other incentives to recycle:
  • Producer responsibility legislation
  • Refundable deposits
  • Eco – taxes
• Present technology in smelting and fume arrestment offers:
  • High performance
  • Improved efficiency