AGGLOMERATION OF BATTERIES LEAD FINES USING BASF BINDERS

Willy Cilengi: Business Development

WHO WE ARE

Agglotek Value Added Resources (Agglotek VAR) is:

- A **level 1 BBBEE** contributor to South African economy.
- Focused on **value addition and beneficiation of fines** in the mining industry through **agglomeration of fines** traditionally considered as waste due to limitations for further processing and difficulty in handling for transportation to end customers.
- Specialised in agglomeration technologies: B**riquetting, Extrusion and Pelletizing**.

WHO WE ARE

- Agglotek team has combined experience of more than **30 years in mining and chemical industries**, offering **environmentally sustainable solution** that will reduce liability associated with the ever-growing tailings and fines stockpiles, inherent to the mining operations.

- Agglotek have access to **innovative binder's chemistry,** compatible with wide range of commodities such as **coal, iron ore, ferroalloys fines, DRI dust, oxide sludge etc...**

- The combination of wealth of knowledge and expertise accumulated by some Agglotek personnel while working in the mining and chemical industry ensures **the company's ability to adapt its systems to the changing needs of customers**

OUR MISSION

Reduce tailings footprint by providing sustainable solution through operational excellence.

OUR VISION

Greening Africa and the World through elimination of minerals waste stockpiles and dams through agglomeration techniques and binding aids innovation.

OUR VALUES

Value creation
Sustainable business solutions.
Honesty and Integrity.
Customer satisfaction.

We Focus on value addition and beneficiation of mineral fines in the mining industry

ABOUT US

Level 1 BBBEE contributor

Providing sustainable solutions

VALUE ADDITION

Fines beneficiation

Agglomerations of fines

Agglomeration technology

Briquetting

Extrusion

Novel binder chemistry

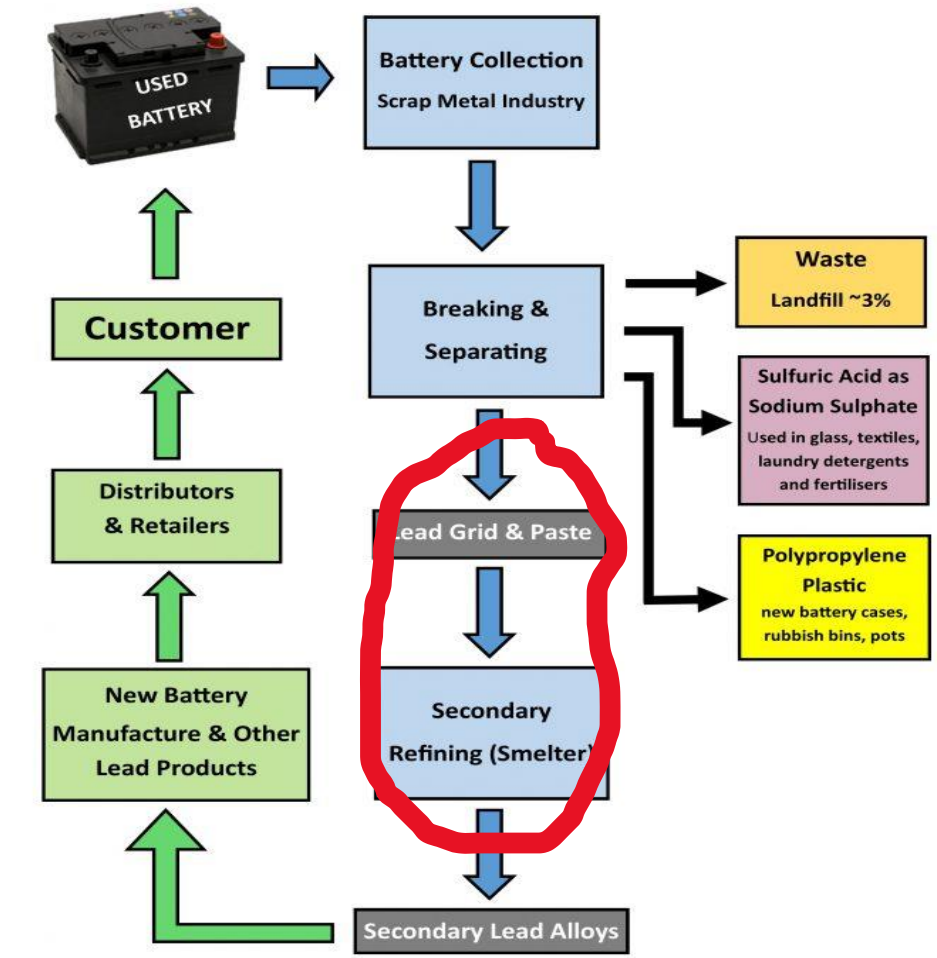
ABOUT THE LEAD FINES AGGLOMERATION

- The automotive industry is the biggest contributor to the economic growth in the world.
- It is the key sector of the economy in the world, registering 30 % increase over the past decade (1995-2005). (1).
- Also, the very same automotive industry contributes to pollution with as engine oil, tyres, starters, alternators, windows & windshield, scrap metals, plastic components, oil filters, engines, mats & carpets (2).
- Some parts are reusable such as headlights, blinkers, taillights, seats, upholstery, exhaust systems, mirrors, ally wheels, transmissions systems and undamaged windows and wind shields (2).

ABOUT THE LEAD FINES AGGLOMERATION

- Other parts are recyclable, such as lead-acid batteries.
- Every year, an estimated 1.8 million used batteries are not responsibly recycled.
- When a lead-acid battery is not properly recycled, lead, acid and mercury are deposited into lakes, streams and landfills (3).
- Recycling old batteries reduces waste...
- Up to 99 % of lead-acid batteries are recyclable. It also reduces the need to use new raw materials & components (1).

THE RECYCLING PROCESS



- THE OLD LEAD-ACID BATTERIES ARE BROKEN APART
- LEAD AND HEAVY MATERIALS ARE SEPARATED FROM THE PLASTIC
- LEAD IS SMELTED INTO LEAD INGOTS.
- DUST CONTAINING LEAD IS GENERATED, COLLECTED IN BAGHOUSE (HEALTH HAZARD).
- INGOTS ARE FURTHER MELTED DOWN AGAIN TO FORM LEAD PLATES AND OTHER LEAD COMPONENTS FOR NEW BATTERIES.(4)
- THE POLYPROPYLENE IS FORMED INTO PELLETS THAT ARE THEN MADE INTO NEW BATTERY CASES.
- THE ACID IS CONVERTED INTO SODIUM SULPHATE AND USED IN DETERGENT, GLASS AND TEXTILE MANUFACTURING PLANTS.

THE AGGLOMERATION PROCESS

- During smelting operation, fumes (lead dust) generated are directed to the baghouse, where the fumes are entrapped and collected to be recycled.
- Due to the fine size of the dust, they become difficult to handle.
- BASF looked at agglomeration (briquetting) of all lead-bearing dust, oxide, dross using organic binders (value addition) to feed briquettes back into the Smelter...
- Preliminary test work confirmed the capability to agglomerate such lead-bearing dust material using BASF binders such as Alcotac CB6, CB11 and FE 14, with target to obtain briquettes.

THE AGGLOMERATION PROCESS

The briquettes produced during the test were able to reach the following characteristics:

- Remain intact when dropped,
- Or if broken, this could be into pieces (> 3mm);
- Resist to weather elements when exposed;
- Resist at high temperature without breaking;
- Melt into to furnace without disintegrating into fines.

EXPERIMENT (6)

Scope of Test

- Agglomerate lead-based material fines using BASF binders;
- Compressive strength of briquettes from Day 0 to Day 7.

Binders Used and Dosages applied:

- Alcotac CB6: 0.6% w/w.
- Alcotac CB 11: 1.0% and 2.0 % w/w.
- Alcotac FE 14 : 0.6 w/w.

EXPERIMENT (6)

Equipment

- Moisture Analyser RADWAG MA 200.3Y. WM (Max. 200 g. d= 1 mg).
- Mettler 2 decimal Balance.
- Kitchen Mixer
- Komareck B50 Roller Press
- Compression Tester (Chatillon 2500 N)
- 1,000 ml beakers.

Moisture Analyser

Planetary Mixer

Komarek 25 kg/hr Roller Press

Compression Testers

EXPERIMENTAL PROCEDURE

- Sample of baghouse dust at 0.60 % w/w moisture and adjusted to 8.0% w/w moisture prior briquetting.
- 1500 gr of lead-based material fines were weighed and placed in the 1,000-ml beaker. 10 g were taken to determine the moisture using the moisture analyzer, which recorded (initial moisture) 0.60% w/w.
- Each selected binder (Alcotac® CB6, CB11 & FE14) was added to the sample and was thoroughly mixed for 3 minutes using the Kitchen Mixer at speed 1.

EXPERIMENTAL PROCEDURE

- Water was added to adjust the moisture to 8.0% w/w before briquetting. 10 g of material were taken to the Moisture Analyzer to record the moisture after binder and water addition (final moisture).
- The mixed binder-sample was transferred to Komarek B50 roller press, and briquettes produced.
- The extracted briquettes were then compressed using the Chatillon Force Gauge 2500 N tester to determine green strength (Day 0) in Newton.
- A green strength average of above 350 N was recorded depending on binder used.
- The remaining briquettes were left to air dry for 7 days.

RESULTS & DISCUSSION

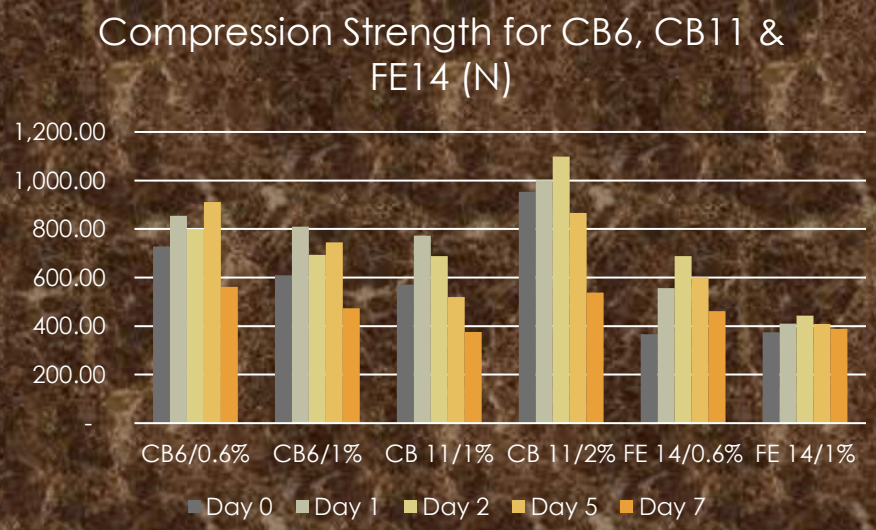


Figure 1 : Compression Strength

Test	CB6 (0.6%)	CB6 (1%)	CB 11 (1%)	CB 11 (2%)	FE 14 (0.6%)	FE 14 (1%)
Day 0	728.33	609.33	571.33	953.67	366.00	375.00
Day 1	854.67	810.33	772.67	1,001.33	556.67	409.67
Day 2	799.00	693.67	688.67	1,098.33	688.67	443.33
Day 5	912.00	745.00	519.67	866.33	601.67	408.67
Day 7	561.33	473.00	375.33	538.67	462.00	388.67

CONCLUSION & RECOMMENDATIONS

- Alcotac® CB11 & CB 6 record better compressive strength reaching 1000 N.
- Lead baghouse dust can be briquetted at controled moisture below 8.0% w/w.
- **A binder's optimisation should be considered (techno-economic case study).**

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