



RECLAIMED SLURRY PROCESSING

Drawing CTT PR 001 A shows the principle of the system explained below

The principal of the plant is to recover lead oxides and water from the general waste associated with the manufacture of lead-acid batteries, the amount of lead oxide recovered from the waste can be as high as 99% and the recovered water content >95%

The reclaimed oxide is classed as slurry as it is a wet item; it is referred to as this throughout this description. Whilst settled in the Lamella it will be a dense slurry and after transfer to the reclaimed slurry holding tank it will be diluted down to the required density for dosing into the paste mixing process.

The reclaimed slurry can be used in either positive or negative paste mixing but the use of reclaimed addition in the positive mix has to be highly regulated. If reclaimed slurry is to be used in the positive mix the area surrounding the mixing and reclaimed process has to be totally segregated from contamination from the negative paste process, and all the liquids used have to be from a demineralised source.

The reclaimed water can be used for general use in the factory but is not suitable for returning to the mix.

The control sequence is by Allen Bradley PLC unit with a HMI unit.

The system of operation is that waste from the factory process flows into a sump via channels in the floor, the dimensions of the sump should ideally be at least 3 x 3 x 2 mts. The waste is then processed as follows;

1. Waste flows to the sump from the factory pasting of paste filling process
2. On a sump high level indication the liquor is automatically pumped to the Lamella
3. The waste liquor is screened for solids at the point of entry at the Lamella
4. The water is separated from the oxide rich waste by the Lamella process
5. Reclaimed water flows by gravity to a reclaimed water tank
6. The oxides settle out in the Lamella to form a dense slurry
7. The slurry level increases to the discharge setting
8. Settled slurry is pumped to the reclaimed slurry tank
9. The reclaimed slurry is agitated at a variable speed dependent on tank level
10. The reclaimed slurry is automatically checked for density by the density meter
11. The density is checked against the required set point required for addition to the mix
12. The reclaimed slurry is automatically adjusted down for correct density with demineralised water
13. The density is continuously adjusted during slurry transfer from the Lamella
14. Reclaimed slurry is circulated within the slurry addition loop when at the correct density
15. Reclaimed slurry is weighed in the reclaimed dosing tank when requested by the mix process
16. The reclaimed slurry in the dosing tank is kept in suspension by an agitator until dumped
17. During the mixing cycle the reclaimed slurry is dumped in the mixer



The method of modifying the paste mixing process to handle reclaimed paste is as follows;

1. A signal is sent from the reclaimed process to the mixer that reclaimed slurry is available
2. If no reclaimed slurry is available, the system ignores the operator request to use reclaimed slurry
3. The operator selects reclaimed addition from the control panel by a selector switch
4. The system will automatically weigh the reclaimed slurry to a weight set on the reclaimed control HMI
5. The reclaimed slurry will be kept in suspension by an agitator until dumped
6. During the mixing process the reclaimed slurry will be dumped during the water addition stage

RECEPTION SUMP

The sump will have an ultrasonic level control (US1) to indicate 0 - 100% level and will have set points for low level, high level and high level alarm. The system is designed to operate automatically between low and high levels and should the level continue to raise to the high alarm level it will indicate an alarm.

SUMP AGITATOR MX1

The agitator will be a single speed unit for single direction. In the selected "auto" position the agitator will operate automatically whenever the level rises above low level, the agitator will not operate below low level.

Manual operation can be by selection.

SUMP DISCHARGE PUMP TO LAMELLA – P1

In the selected auto position the pump will start automatically on high level being reached in the sump and will stop on low level. On every start of the pump a counter will increment one step to five and then a signal will be sent for a Lamella discharge request.

The discharge from the sump will be adjusted by the divert valve V1 which will limit the flow rate to the Lamella to approx 4M³/ph. The pump can also be operated in manual mode and will stop on low level being reached; the pump will not operate unless the agitator has been operating for a period of 5 minutes.

LAMELLA

The Lamella will have a density sensor (LC2) which will monitor increasing density as the slurry settles, this unit will be self contained on the Lamella. A digital indication is sent of high density within the unit and this will trigger an alarm for its requirement to be emptied.

DISCHARGE PUMP – P2



The Lamella discharge pump will be manually started when a high density alarm is indicated from the Lamella and will run for a period set for the Lamella pump run time. The pump will stop when either it's selected off or when the internal PLC timer expires. No discharge from the lamella will be allowed to start when the reclaimed slurry tank is at high level.

BRIDGE BREAKER

A bridge breaker (BB1) is employed to loosen the slurry during transfer from the lamella; this will be a solenoid operated device and will operate via recycling timer whenever the Lamella discharge pump is running.

RECLAIMED SLURRY TANK

The tank will have ultrasonic level control (LC3) to indicate 0 – 100% and will have trip points for low level, high level, and high level alarm. The level will be indicated across several HMI screens.

AGITATOR – MX2

The agitator is to be a reversing unit controlled by Allen Bradley inverter; the speed will be variable dependent on the level in the reclaimed tank. The agitator will raise an alarm if the level is above low level and the agitator is not running. The agitator can operate in either auto or manual mode.

DENSITY MONITOR – DM1

The density monitor DM1 will check the reclaimed paste for density by a continuously circulating flow from the pump P3. The initial density from the Lamella will be quite high and will be required to be only adjusted down. This function will be performed by the addition of demineralised water from the proportional controlled inlet valve V8; this valve will open dependent on the proportional amount the density is out of specification.

The required density and actual density will be indicated on the HMI.

OUTLET VALVE V6 / INLET VALVE V7

The valves are monitored for position by the PLC as for the set use; they can be for position washing or slurry.

SLURRY TRANSFER PUMP – P4

The pump shall be controlled from the HMI and will be monitored by level control LC3. The pump will be inhibited from running if the level is below low level.

The pump will be inhibited from running in slurry circulation mode unless the agitator has been running for five minutes. The slurry will be constantly circulated between the mixing and reclaimed slurry tank and upon the requirement for slurry addition a diversion valve V3 will be operated allowing slurry addition to the reclaimed dosing tank.



The circulation pipe work must be washed whenever the slurry has not been circulating for more than 4 hours, this wash water will return to the sump for processing through the Lamella.

OUTLET VALVE V2 / INLET VALVE V4

The valves are monitored for position by the PLC as for the set use; they can be for position washing or slurry.

RECLAIMED DOSING TANK

When during the paste mixing process, the requirement is for recovered paste a signal is sent to the process and recovered paste will be batched weighed to a set point as required. It will be kept in suspension by the agitator MX3 and be dumped into the paste by valve V5 on a command from the mixing process.

USING RECOVERED SLURRY

The use of recovered slurry in the mix can be as much as 15% of the actual oxide weight used, therefore a 1000 kg oxide mix can use 150 kgs of recovered oxide in the slurry.

The method of use is to accept the required slurry density for use in the mixing process, this will be about 2.0 – 2.5 s.g. dependent on the application.

Process.

1. Use a 1 litre glass container and weigh it
2. Take a sample of the slurry and fill the container
3. Take the combined weight and subtract the weight of the container
4. This is now the slurry weight
5. Place the container in the oven for 24 hours until the water content is removed
6. Calculate the amount of oxide and water present in the slurry at this density

For example:

1 litre of slurry weighs 2.5 kgs

After placing in the oven the weight of oxide is 2 kgs

The mix process calls for 1000 kgs of oxide

The reclaimed allowance is 15%

The weight of the reclaimed slurry to be weighed is 187 kgs

This will allow for 150 kgs of reclaimed oxide into the mix and 37 kgs of water

Therefore the paste recipe when using reclaimed slurry reduces the oxide weight by 150 kgs to 850 kgs, and the water content by 37 litres