

SGM Magnetics' Solution For Processing Shredder Residue Fines.

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SGM's proprietary solution for processing auto shredder residue (ASR) fines combines cutting-edge technologies in scrap separation to maximize recovery and purity of the metals in ASR fines. The design of SGM's process optimizes the working conditions and performance of each technology applied.

The SGM Micro Fines Plant (MFP) infeed material consists of minus $\frac{3}{4}$ " or minus $\frac{1}{2}$ " fines from a shredder residue plant, typically, and respectively representing 40% and 30% in weight of the total shredder residue waste.

The SGM MFP's purpose is to process 100% of these fines, guaranteeing no more than 0.2% of nonferrous metals remain in the final waste stream.

Based on today's market prices for metals, a conservative estimate of the additional profit an SGM MFP can achieve is approximately \$50-\$55 per ton of ASR fines processed, or approximately \$4-\$5 per ton of shredder infeed. This number varies from one site to another depending on the nature of the shredder feedstock and on the equipment installed at the residue plant. The only performance measurement SGM can control and to which it can commit itself is that no more than 0.2% of nonferrous metals will be left in the MFP waste.

The moisture content of the material plays a key role when processing ASR fines for metal recovery, as every operator who has compared metal recovery performance when running material that was processed dry versus wet knows. Clearly, the situation depends on the location of the plant, as a plant operating in the southern U.S. is not the same as one operating in the north.

The SGM MFP includes a dryer that guarantees a consistent moisture content for the fines material



High copper zorba

of 15%, nothing less, minimizing drying requirements and costs while optimizing metals liberation and preventing dust emissions. SGM prefers to use an electric dryer, which does not require a specific permit to operate. Before the dryer, the SGM MFP features air gravity separators that remove the lightest particles of the fines, which are free of heavy pieces such as metals. This allows the dryer to only process 50% to 60% of the ASR Fines. Drying cost per ton processed is dependent on local electricity costs, but it is typically around \$2 to \$3 per ton processed.

The dryer features moisture probes at its entrance and exit, allowing the system to automatically adjust the drying process according to the effective moisture content of the material. Working

with material that has a constant moisture content, regardless of the location, the time of the year and the time of the day, facilitates optimization of the MFP, as well as its operation and maintenance.

One of the main reasons why nonferrous metals are lost in ASR fines is the entrapment of these metals in the magnetic dirt fraction, which typically can represent 30% to 40% of the fines. The higher the moisture content of the fines, the more entrapment, and the higher the loss of valuable metals in the magnetic dirt fraction. For this reason, the SGM MFP only uses ferrous magnets after the dryer, where entrapment is reduced to a minimum.



Good ferrous

After the dryer, material is processed on a large air gravity table to remove the light fine waste produced by the drying process. The material, which at this point is less than 50% of the infeed ASR fines, is screened at 6 mm, with the large fraction passing on to ferrous separators, followed by high frequency eddy current separators and subsequently by sensor based separators. A proper size ratio

and reduced moisture content optimizes the recovery and purity performance of these separation technologies for the recovery of ferrous nuggets, zorba and insulated copper wire.

ASR smaller than 6 mm contain valuable fines and ultra-fine nonferrous metals that ECS cannot capture and for which the state of the art technology to recover them is based on air gravity tables.

To facilitate operation and to optimize performance of air gravity tables, material must be dry, and sized finely. You must avoid trying to separate particles of similar apparent specific weights, namely aluminum, rocks, glass and insulated copper wires. Indeed, if you process these materials on an air gravity table, you end up losing some aluminum and insulated copper wire to the lights and some glass and rocks contamination to the heavy fraction.



<6mm fines with rocks and glass

The SGM MFP process is designed to optimize the use of the air gravity tables to optimize their performance in terms of fines and ultra-fines metals recovery and purity.

Minus 6 mm material is processed by an impact crusher to reduce the large quantity of rocks and glass present in this fraction to dust. The SGM impact crusher is straightforward and user friendly in terms of design and maintenance. The crusher is followed by a screener that removes the crushed rocks and glass. Special care is paid to the dust

produced by the crusher, which is discharged and conveyed in a dustproof way to a storage silo.

The large fraction coming from the impact crusher comprises solid pieces of metals and inert pieces, such as plastic and wood. Metals in this fraction consist of aluminum, heavy metals and precious metals. The material is passed on an ECS separator to recover the aluminum before the final screens and air gravity tables. At this point, only the heavy metals with a specific weight over 6 and heavy inert material, such as plastic and wood with a specific weight lower than 2, end up on the air gravity tables, allowing for optimum separation performance.



Crushed rocks and glass

SGM can size its MFP for shredder operators processing more than 40,000 tons per month or can offer a simplified version for operators shredding 5,000, 10,000, or 20,000 tons per month. A realistic pay-back for the investment is between two and three years.

In today's difficult market conditions, SGM's offer to the market is very flexible and goes from the traditional sale of its MFP to a proposal for sourcing agreements where SGM supplies, owns and operates a MFP on its customer's property while the customer supplies its ASR fines to the MFP and continues to take responsibility for the disposal of the waste. Profit is split between SGM and the customer. The sourcing agreement has a minimum

duration but can also include a buy-out option for the customer, so not only are SGM's interests aligned with its customer's interest, but the customer also can decide to buy the MFP after having verified its effective performance over a sufficiently representative length of time.



High copper product

In any case, the metals recovered by the SGM MFP are finished commodities that are sold directly to refineries. This means that the SGM MFP does not produce concentrates which are to be sent to a polishing process away from the partner's effective control.

The standard SGM proposal for its MFP remains the traditional sales offer, with sourcing agreements only contemplated upon invitation by customers.

SGM has entered into a sourcing agreement with Upstate Shredding (www.upstateshredding.com), Owego, New York,) for processing the company's ASR fines (minus 3/4") generated by the more than 70,000 tons of material shredded every month. The SGM MFP will start operation at the end of 2016.

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