

Apache Mill Tailings USA, Inc.

Aerodynamic Metals Extraction



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APPLICATION:

Dry mining equipment and machinery is designed and configured for pulverization/dehydration of metals bearing ores and mining wastes, classification, concentration, separation and recovery of metals and minerals concentrate in dry mode and without the use of water.

Dry processing has many advantages over wet processing, especially the conservation of water, one of our most precious resources.

Dry mining equipment and machinery is designed and configured for pulverization/dehydration of metals bearing ores or matrixes for the concentration, separation and recovery of precious metals, light metals and other heavy metals, either from placer (alluvial) deposits or primary surface or subsurface (hard rock) applications, and wastes from mining operations.



Aerodynamic Metals Extraction

ADVANTAGES:

The dry mining equipment and machinery (Processing Plants) produce higher grade products with less concentrate loss than wet concentration methods.

Apache's Dry Processing Plants may be located anywhere (self-contained energy requirements), regardless of water supply. There is no water to pump or bring from a distance, therefore eliminating the cost of pipes, pumps and related overhead costs.

In most cases dry processing plants increase capacity, cuts down on the number of units and space necessary; resulting in smaller and less expensive plants with lower power costs.

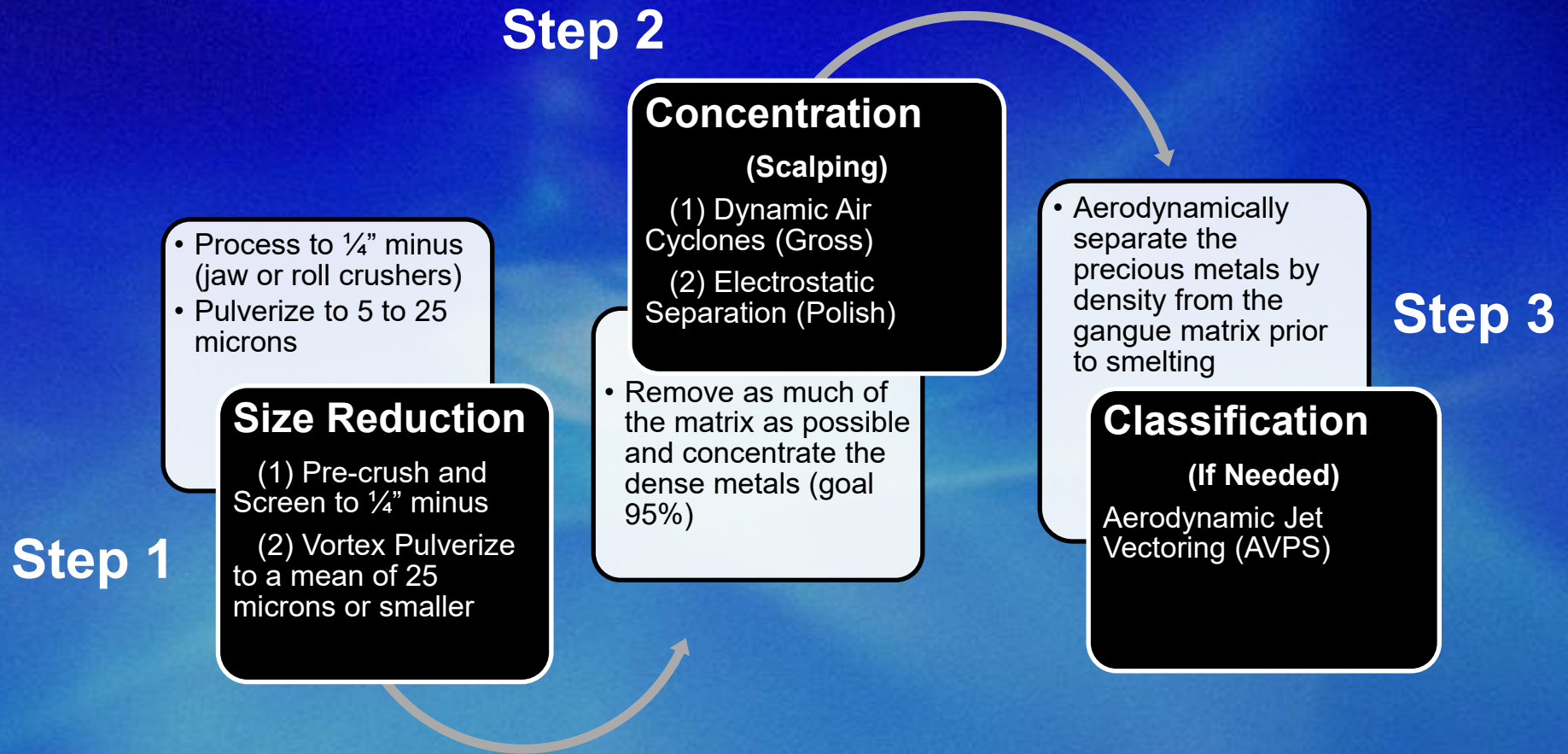
Due to greater sensitivity to slight differences in density of the particles, Apache's Processing Plants will successfully treat ores which are not amenable to wet concentration in the gravity separation methods.

Dry ore may be efficiently separated at the economical releasing point of the minerals, thus making sure the resulting products are dry and are handled, shipped and marketed at a lower cost than wet processing methods.

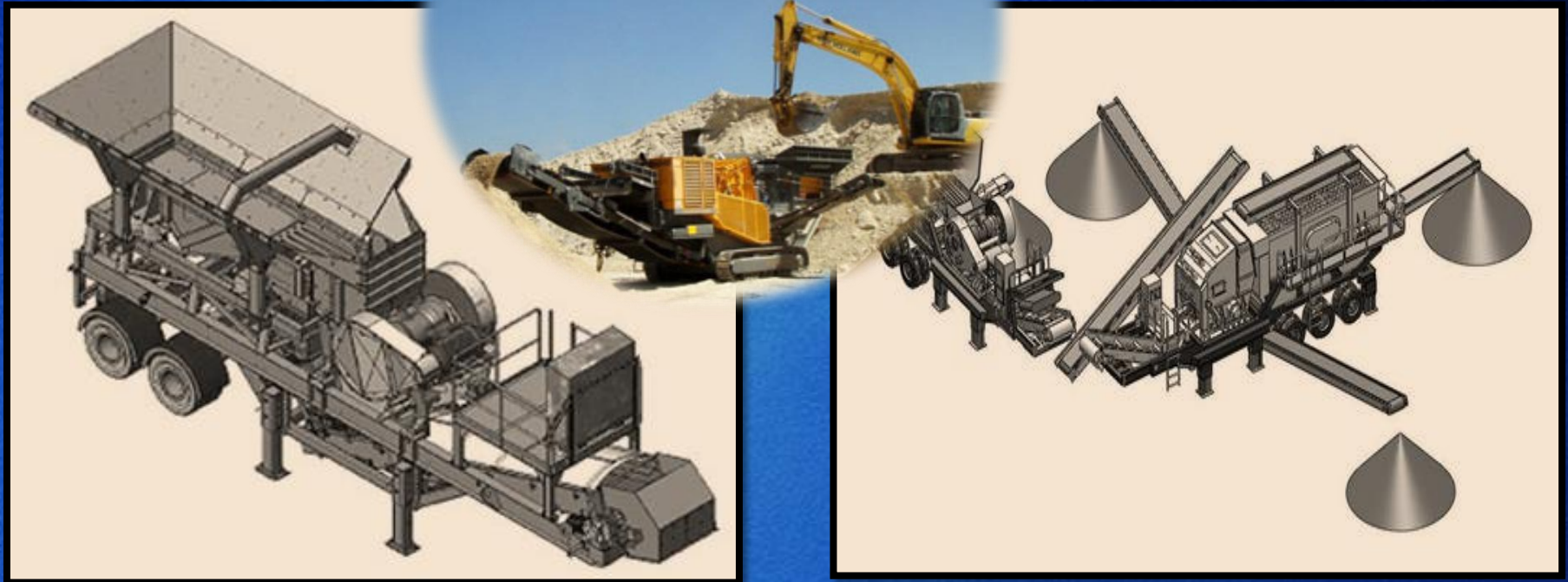
Since no water is needed to produce separation, climatic conditions will not affect efficient operation.



Process Overview



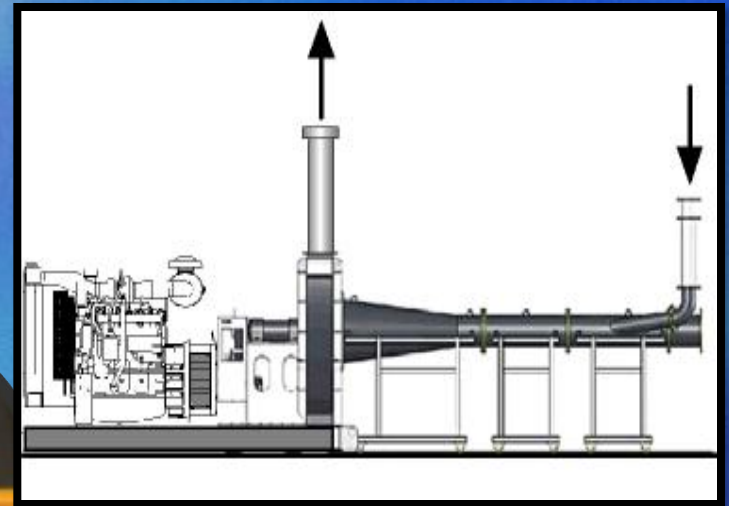
Excavate, Crush & Screen (to 1/2" – 3/4")



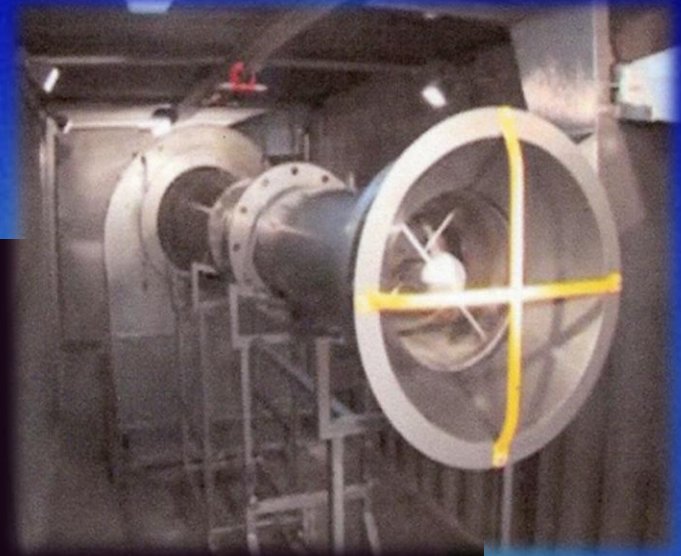
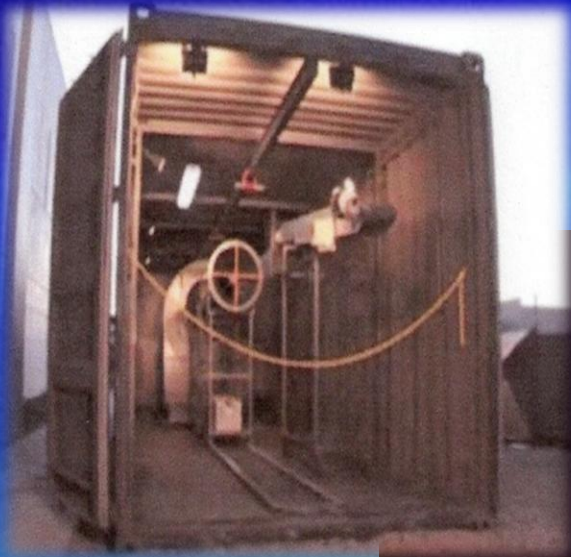
Mobile Crusher and Screening Units

Step 1 – Size Reduction

- Apache has a license on a unique size reduction (communion) process with an organization out of Texas for the pulverization and dehydration of metal bearing ores and tailings.
- Their process has taken a number of years to develop; originally based on the Windhexe “tornado in a can” design and patents through licensing agreements, but have been dramatically altered with the different designs for a vortex pulverizer that also includes dehydration.



Step 1 -Vortex Pulverize (to >25 microns)

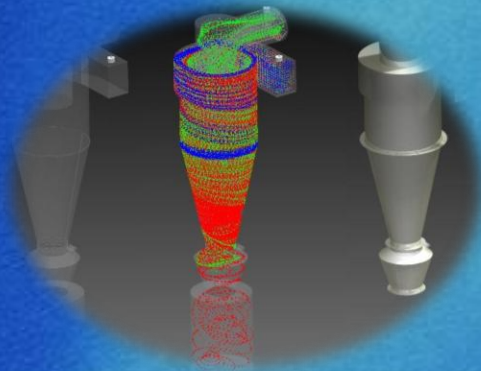


Source : KinetX Tech

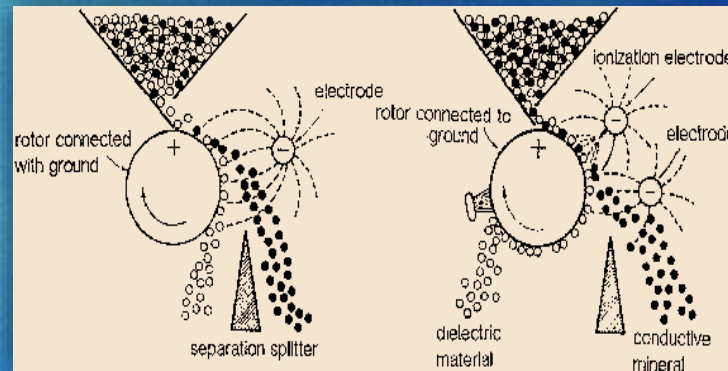


Step 2 – Air Classification (Concentration)

- To insure that the majority of the contaminants have been removed, Apache has developed a new aerodynamic air classification system that utilizes conventional cyclones combined with specialized separators for concentration of metals.
- The system then separates the mineral grains by a process called "electrostatic beneficiation", which means charging them with static electricity and separating the different minerals where the minerals have different electrostatic affinities.



Conventional Classifier



Electrostatic Principle



Layout



Step 3 - Aerodynamic Particle Separation (APS)

An aerodynamic actuator using steady suction has been used to sort particles of various sizes and densities.

- The system has the ability to sort spherical particles with similar size distributions that differ in density by a factor of four simply by modifying the flow speed appropriately, and
- (2) for uniform particles, the standard deviations are very low (in most cases, less than $2\text{ }\mu\text{m}$). Cut sharpness as high as 0.9 were measured.
- APS is also capable of concentrating air samples. Our measurements indicate that an air sample containing particles with the density of water can be concentrated by a factor of 10.



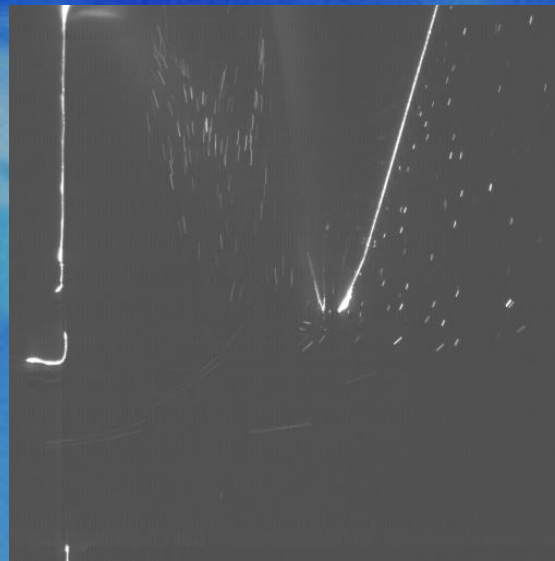
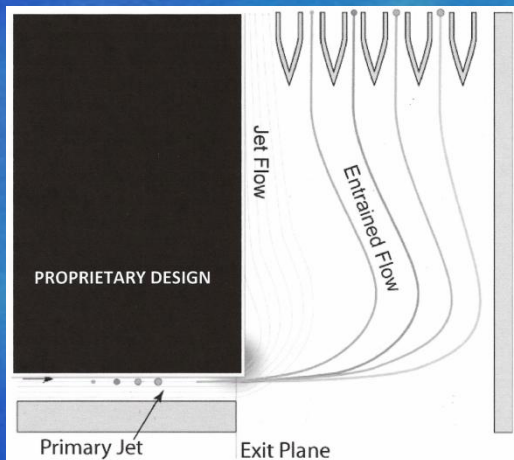
Step 3 - Aerodynamic Air Classification (Cont'd)

Light Particles

Collection Patricia

Dense Particles

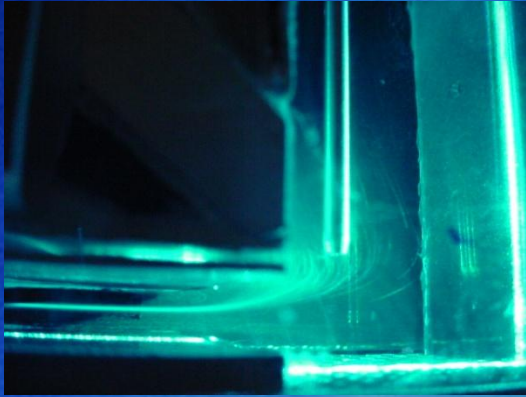
Collection Patricia



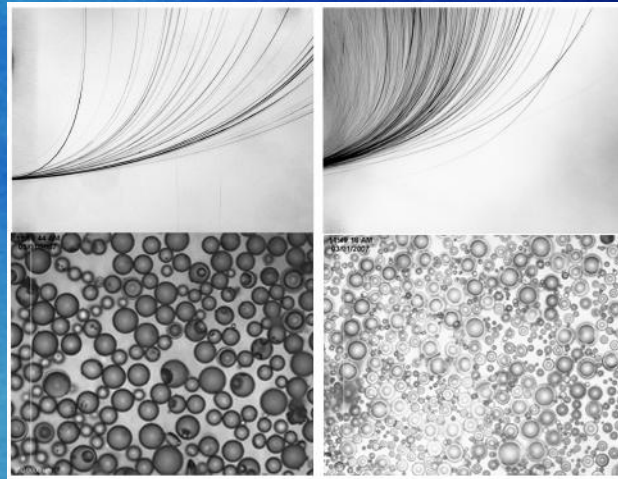
High Speed Video

Diagram of Sorting System

Step 3 - Aerodynamic Air Classification (Cont'd)

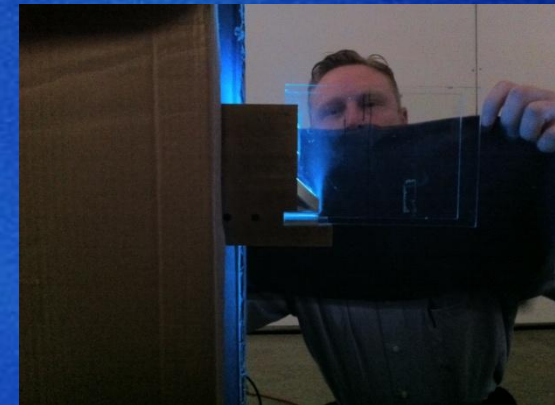


Sorting Distribution
in Operation



Sorting Distribution

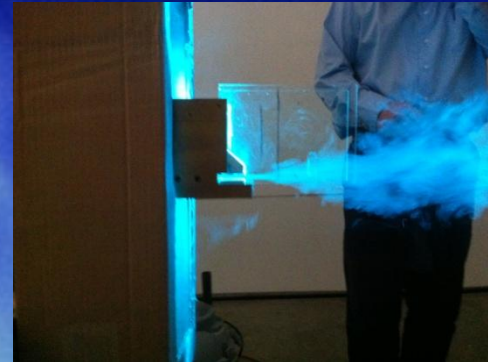
Sorting Distribution
in Operation



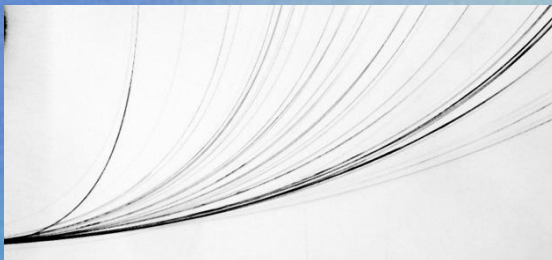
Step 3 - Aerodynamic Air Classifier (Cont'd)



Small Lab Scale Unit



Laser Light View of Initial Operation



Sorting Distribution



Laser Light View of Sorting Operation

“One never knows what will happen if things are suddenly changed. But do we know what will happen if they are not changed?”

--Elias Canetti

