

DE BEERS TECHNOLOGIES

RhoVol

The RhoVol machine is a densimetric measurement system that determines the density of an ore sample, by measurement of the mass and volume of the sample, on an individual particle basis.

The machine processes batches totally autonomously and data is displayed live as it is captured, as well as in a standard spread sheet format on a per particle basis. The Machine is material independent and density measurement range is programmable but not restricted.



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FEATURES

- No toxic heavy liquids
- High speed weight measurement
- Auto calibrate capability
- External vibration compensated
- Portable
- Safe and easy to use
- Hands free process
- Small sample size requirement
- Data confidence-level tracking
- High measurement repeatability
- Useable data format
- Material type independent
- Particle shape independent
- No top or bottom cutoff in density range measurement
- Specialized measurement algorithm
- Specialized reconstruction algorithm to determine shape information
- Shape calibration capability
- 3D Volume reconstruction
- Multipass functionality

SPECIFICATIONS

- 1000 particles/hour average processing time
- Sample batch capacity 2 liters or less (-8mm +3mm, dry, dust free)
- Single particle feed regime
- 6 mg minimum particle mass
- 50 µg mass repeatability
- 20 g maximum particle mass

DATA AVAILABLE PER PARTICLE

- Weight
- Volume
- Density
- Sieve size (square or round)
- Caliper (a, b, c, smallest)
- Flatness
- Elongation
- Compactness
- Convexity
- Surface area
- Roller gap size

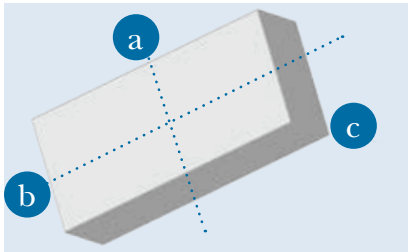
FUTURE DEVELOPMENTS

- Ultra Fines unit (-3mm +1mm)
- Coarse Machine (-24mm +8mm)
- Material Sorting capability



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DEFINING THE SHAPE FACTORS



Square sieve



Minimum enclosed sphere

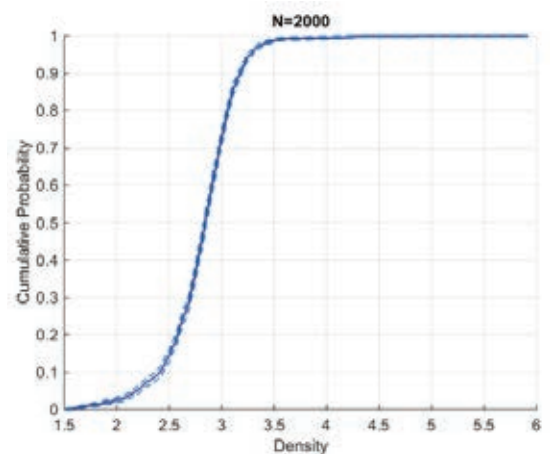
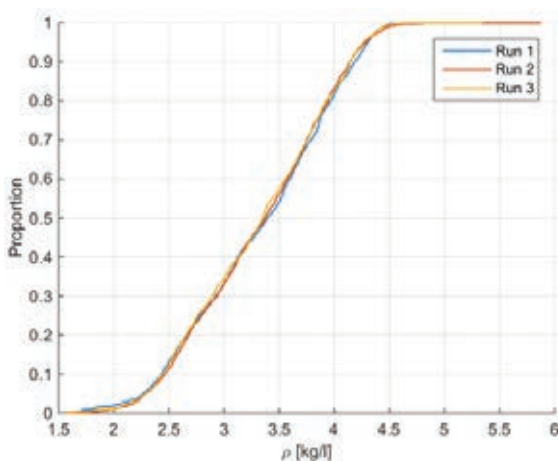


Round sieve



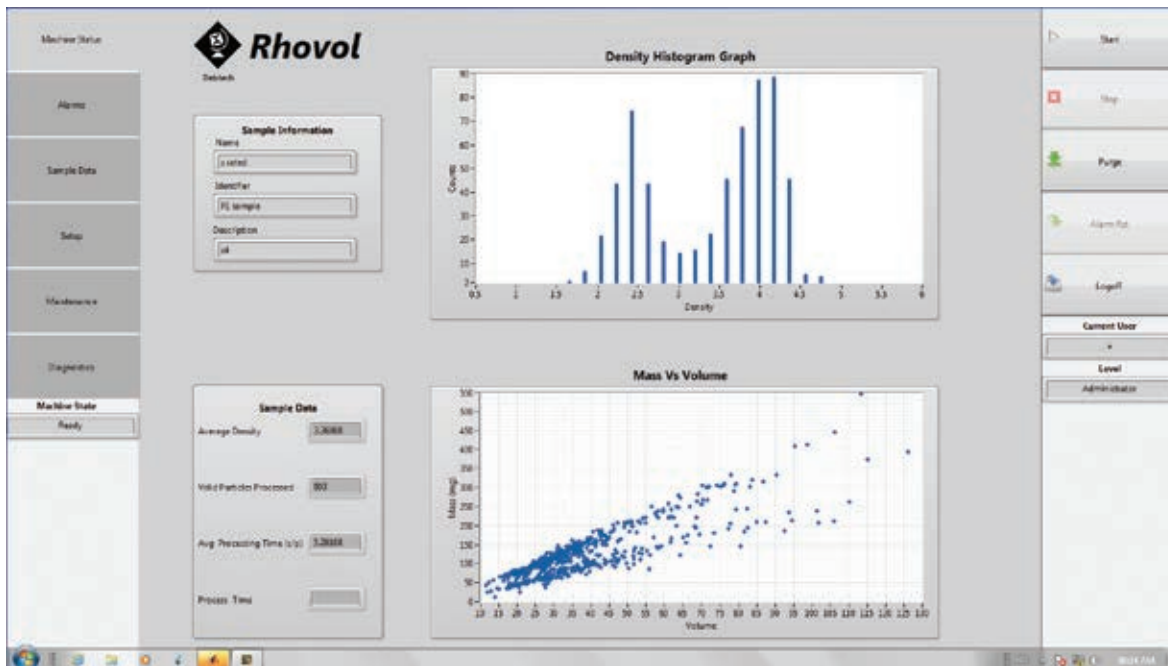
Caliper

- **a, b, c:** Caliper diameters along each of the particle's principal directions, resulting in 3 orthogonal measurements where 'a' is the longest caliper, 'b' the intermediate and 'c' the shortest. Measured in millimeters.
- **Flatness:** A value larger than 1 related to the flatness of the particle and defined by the ratio of b:c. A sphere has flatness equal to 1.
- **Elongation:** A value larger than 1 related to the elongation of the particle and defined by the ratio a:b. A cube and a sphere have elongation equal to 1.
- **Compactness:** A value smaller than 1 related to the compactness of the particle and defined by $\left(\frac{bc}{a^2}\right)^{1/3}$. A cube's and a sphere's compactness measures 1.
- **Volume:** The volume of the 3D model of the particle. Measured in cubic millimeters.
- **Smallest enclosing square prism:** This measurement emulates the physical process of sieving using a square aperture sieve. Measured as the edge size of the smallest square hole in the particle will pass straight through in millimeters.
- **Smallest caliper:** This measurement emulates gap sizing. Measured as the smallest gap that the particle will pass straight through in millimeters.
- **Surface area:** The surface area of the 3D model of the particle. Measured in square millimeters.
- **Convexity:** A value between 0 and 1 indicating how convex the particle is and defined by the ratio $\text{volume} : \text{convexVolume}$. The convexVolume of a particle can be imagined as that obtained by pulling a balloon tightly around a particle, thus covering any concave volumes within the particle. A coffee mug would for instance have its empty interior included in its convexVolume whereas its actual volume excludes the empty interior. A sphere and cube have convexities of 1.

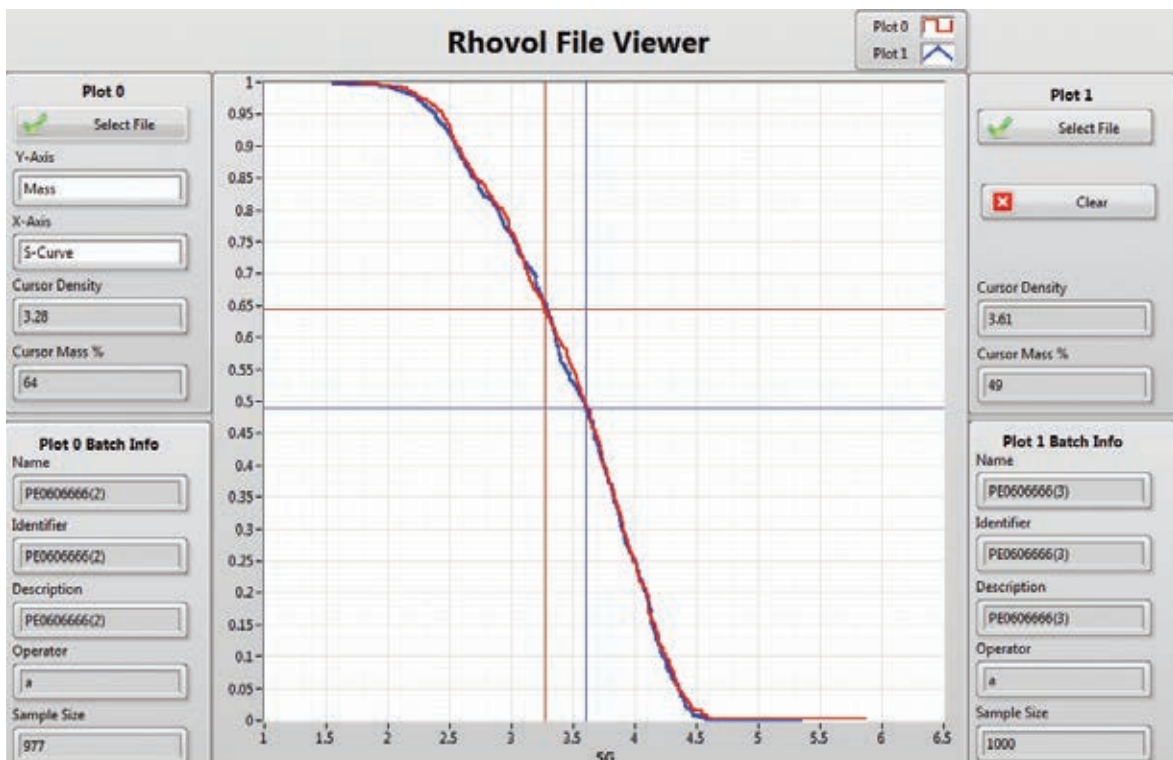


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DATA PRESENTATION



Measurement output online display



Stand alone viewer software