

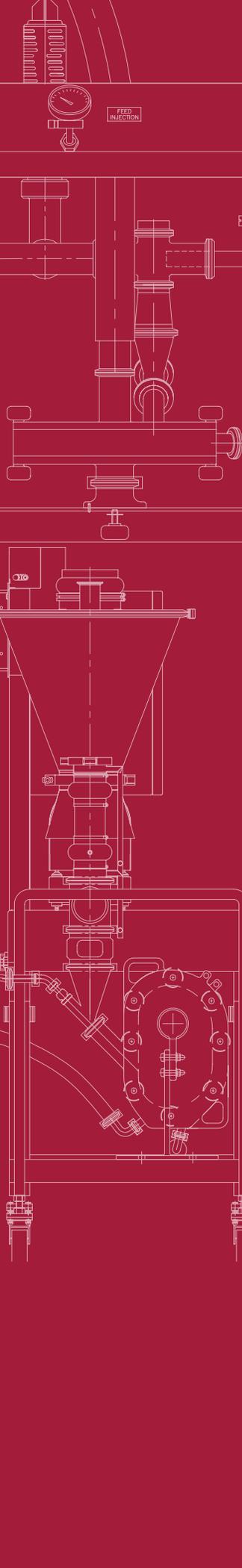


produce superior pharmaceuticals



solutions for
Pharmaceutical Engineering

www.sturtevantinc.com



USDA Accepted Design

The Sturtevant Micronizer® featuring a USDA accepted design enhances active ingredients performance by reducing pharmaceutical powders to a narrow, uniform particle size for better dosage control, absorption, dispersion and inhalability.

Reduce to Narrow Particle Size Distribution

Consistent performance is critical to consumers treated with pharmaceutical products. Proper administration of pharmaceuticals requires manufacturers to have control over particle shape and particle size distribution of active ingredients and excipients. To accomplish this, pharmaceutical companies use the Sturtevant Micronizer® during research, development and manufacturing of products.

Why Particle Size Matters

Reducing particle size increases the surface area of pharmaceutical powders. The Noyes-Whitney equation states that dissolution rate is directly proportional to particle surface area, meaning, finer particles promote faster drug dissolution. Furthermore, the narrow particle size distribution generated by the Micronizer® will provide a more uniform dissolution rate, thereby improving predictability of release and precision in dosing.

Lactose Placebo Performance in Micronizer®

| Feed: | d100 = 1100 µm | d90 = 640 µm | d50 = 288 µm | d10 = 62 µm |
|-------------|----------------|--------------|--------------|-------------|
| Test No. 1: | d100 = 10 µm | d90 = 4 µm | d50 = 2 µm | d10 = 1 µm |
| Test No. 2: | d100 = 45 µm | d90 = 18 µm | d50 = 7 µm | d10 = 1 µm |

The Micronizer® SDM

The Micronizer® SDM, specifically engineered to meet the needs of the pharmaceutical industry, is listed with the USDA as compliant with the standards for sanitary design and accessibility. Simple SDM controls provide users with the flexibility to vary particle size distributions and maximize repeatability.

Inventing the Micronizer® jet mill over 60 years ago makes Sturtevant both the worldwide expert in fluid energy milling as well as the most popular choice for this technology worldwide. No company has sold and engineered more fluid energy mills than Sturtevant.

- No moving parts or jet nozzles
- No contamination from lubricants or media
- Able to disassemble in minutes for easy cleaning and sanitation
- No heat is generated protecting sensitive materials
- Safely process materials susceptible to oxidation or explosivity using inert gas
- Rental systems available for in house testing of proprietary materials

The Sturtevant Advantage

Sturtevant offers a global network of sales and service representatives for its customers worldwide. The company delivers the industry's best service, experience and reliability ensuring customer satisfaction and the competitive advantage customers demand.

Service

- All operations are under one roof resulting in fast, reliable problem solving
- A fully equipped test facility helps customers determine the best way to achieve fine particle sizes and understand processing characteristics
- A skilled field service team is available for start-up of new equipment and field inspection of existing installations

Experience

- Sturtevant has been perfecting particle size for over 130 years with thousands of installations in over 100 countries
- Sturtevant employees average over 20 years of service
- Customer driven innovation, including more variety and accessories than any other air classifier manufacturer

Reliability

- Sturtevant is a family run business currently in its fifth generation of family management
- Made in the USA with domestic components
- Over 60% of sales are repeat customers



Sturtevant Micronizer®



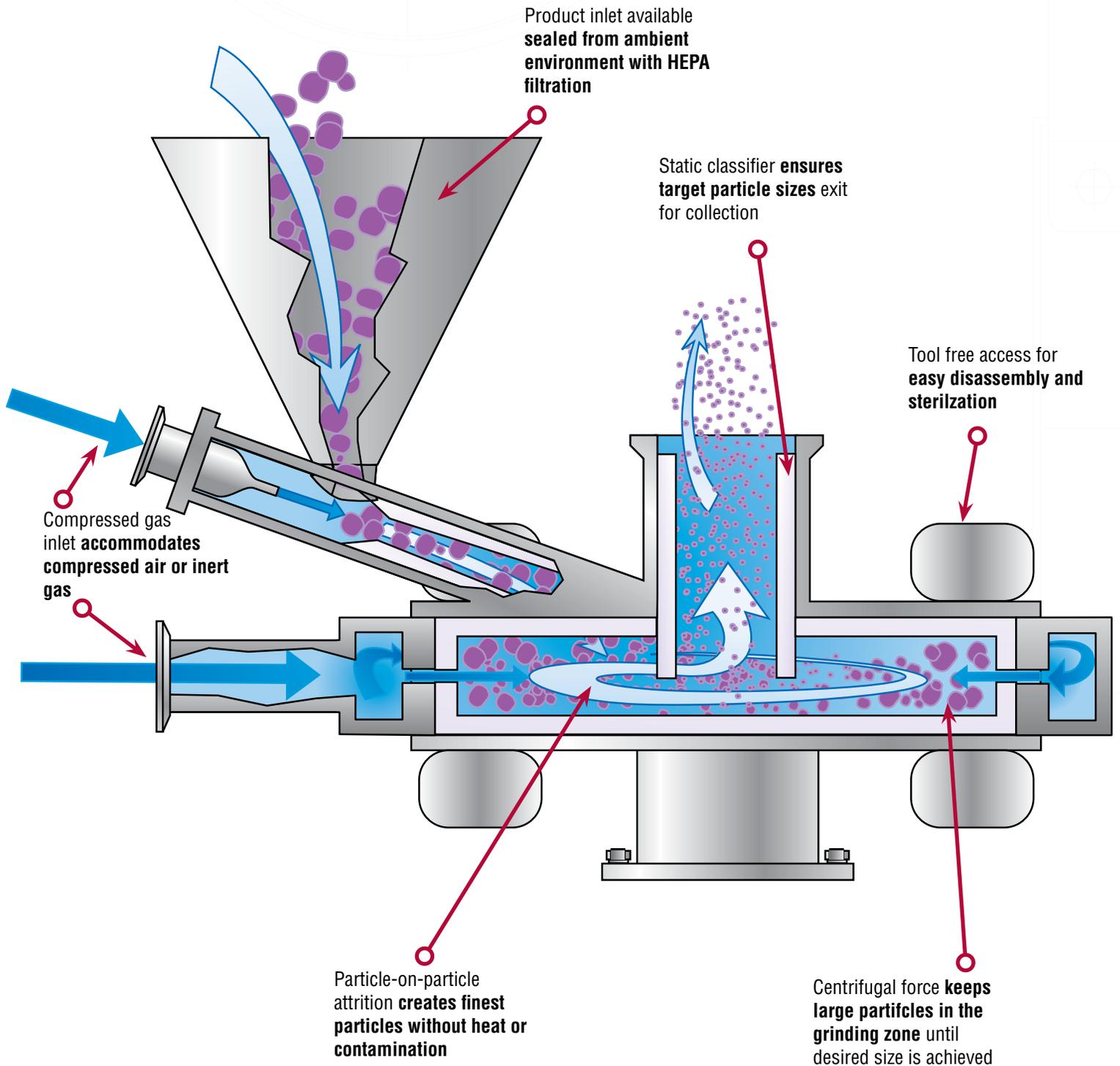
The Sanitary Micronizer® is the first jet mill listed by the USDA.

STURTEVANT®

Pharmaceutical Engineering – Micronizer®

Benefits:

- Mill to low micron particle sizes
- No heat or contamination



Pharmaceutical Engineering – Micronizer®

- Narrow particle size distribution
- Better control properties

Benefits:

How it Works

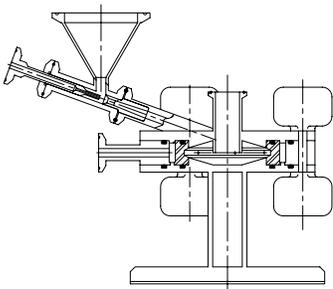
The Sturtevant Micronizer® is a jet mill (fluid energy mill) employing compressed air or gas to produce particles as fine as less than one micron. Inside the Micronizer, precisely aligned jets create a vortex. Material is fed into this vortex along an engineered tangent circle and accelerates.

High-speed rotation subjects the material to particle-on-particle impact, creating increasingly smaller fines. While centrifugal force drives large particles toward the perimeter, fine particles move toward the center where they exit through the vortex finder.

- No dead zones to trap material
- No moving parts to wear
- No grinding media or lubrication to contaminate milled products



SANITARY MICRONIZER®



| Mill Size / Diameter | Energy Requirements / ¹ Compressed Air / Gas SCFM | ² bhp | Capacity LBS/HR | KG/HR |
|----------------------|--|------------------|-----------------|----------|
| Qualification | 8 | 2 | 1/8 - 1 | .05 - .5 |
| * 2" | 20 | 5 | 1/2 - 2 | .2 - .9 |
| * 4" | 55 | 13 | 2 - 40 | .9 - 18 |
| * 8" | 130 | 31 | 10 - 100 | 4 - 45 |
| 12" | 260 | 62 | 30 - 250 | 13 - 113 |
| 15" | 350 | 83 | 50 - 300 | 22 - 136 |

¹Volume of free air at 60°F, 14.7 psi compressed to 100 PSIG. Includes air consumed by feed injector nozzle.

²Approximate HP necessary to generate 100 PSIG compressed air.

Company History

Sturtevant was founded in the state of Maine in 1883 by Thomas L. Sturtevant, who recognized the need to limit human exposure to harmful fumes and acids common to the fertilizer industry. He designed the Mechanical Den and Excavator, a machine which revolutionized the batch processing of super-phosphate.

During the late 1800's Laurance H. Sturtevant, a son of the founder, and Thomas J. Sturtevant, T.L.'s nephew, joined the Company. T.J. Sturtevant, an M.I.T. graduate, was an engineer and inventor whose genius, coupled with the design, and application talents of the other Sturtevants, provided the company with its initial thrust.

In the early 1900's, designs were made for crushing, grinding, blending, mixing and related material handling equipment. Venturing into the automotive field in 1904, T.J. designed the first automatic transmission. Other diversifications included a Bale Pulper for the paper industry and stainless steel control valves for industrial purposes.

In 1920, the company took over the Newaygo Screen Company. In redesigning those products, Sturtevant added to its line a vibrating type of screen for the fertilizer industry. During the 1930's, the Sturtevant Air Separator represented a cutting edge technology, developing the predominant method of making cement. In the 1940's, the firm participated in the WWII effort by servicing Navy yards and the chemical industry. The post war era created massive demand for cement in the construction industry, to which Sturtevant responded. In the 1950's, Sturtevant introduced an ultra-fine grinder, the Micronizer®, and developed pulverizers that introduced a new concept of fine grinding by impact.

For decades the Company continued to innovate and advance technology while remaining a family institution. The tradition of family management has continued from its inception to the present and is currently in its fifth generation.

To this day, Sturtevant continues to lead the way in unique applications-based systems to meet the demands of a developing market. The company delivers *Service, Experience and Reliability* that ensure customer satisfaction and the competitive advantage that its customers demand.



The early years of engineering and innovation.



The Sturtevant's designed the first automatic transmission automobile in 1904. US Patent #766551 was the first of several patents on their gearbox mechanism.



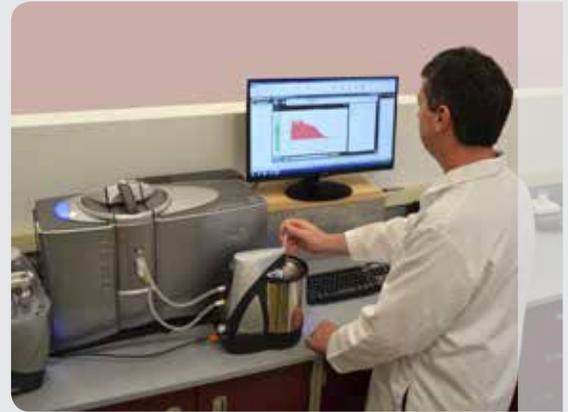
Put Sturtevant to the Test

Don't just take our word for it, let us prove how you can make high value-added premium pet food products. Customers regularly send in their animal by-product meals and visit Sturtevant to witness air classifying tests in our test facility.

Sturtevant's fully equipped laboratory and test facility in Hanover, MA can test animal by-product meals and generate samples of high value-added premium pet food products. The data can also be used to properly scale-up to high capacity production air classifiers. Customers will benefit from hands-on experience, equipment operator training and technical presentations. Contact us to arrange a test date and experience our service and reliability.



Sturtevant's test facility



Laser diffraction analysis



Field Services

- Sturtevant's service department is available to assist with the installation and start-up of new equipment.
- Highly qualified engineers can provide a comprehensive field inspection to evaluate your machine's condition and recommend adjustments to keep your machines running in peak performance.
- Sturtevant's service engineers will review and assist with the optimization of your process and maintenance procedures and provide operator training.





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