

 **union process®**



**DRY GRINDING  
ATTRITORS**



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# Dry Grinding Attritors

SD, HSA, and Lab Series

## History



From a revolutionary idea proposed and developed by Dr. Andrew Szegvari in 1945, Attritor technology grew to become the basis for Union Process, Inc., an independent, family-owned American company founded in Akron, Ohio. Today, Attritors are considered to be the most efficient

grinding/dispersing systems and are used in scores of industries and research laboratories worldwide. More recently, Union Process has developed Attritors specifically designed for the dry grinding process.

## Continuous or Batch Operation

### SD Series

The SD Dry Grinding Attritors can be operated in both continuous and batch processing applications. In the continuous operation, the material is fed into the vessel at the top. It then migrates through the agitating media bed where it is processed to a desired particle size and is discharged through metering bar grids at the bottom of the tank.

In the batch mode, material is charged into the mill at the top, ground for a predetermined time, then discharged through grids at the bottom. The system can easily be sealed for grinding under inert gases such as nitrogen or argon.

The SD Attritor is also used to make dispersion-strengthened metal (DSM). In this process (known as mechanical alloying or cold welding), the kinematic porosity results in the grinding media breaking the metals into small particles and beating them together to form agglomerates. By repeating the process, the various metals are evenly mixed and dispersed to form a new composition of alloy (DSM).

### HSA Series

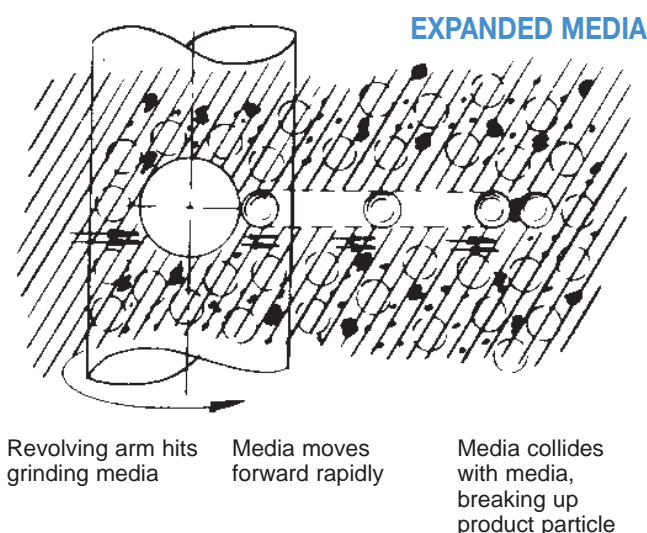
The HSA High Speed Attritor is generally used in a continuous mode. The material is charged into the mill at the top and is discharged out the bottom side, making use of centrifugal force. The HSA is used when smaller particle size (generally 40 mesh) materials are fed into the machine and micron size end product is desired.

Also, it is often used for fibrous and polymer types of materials.

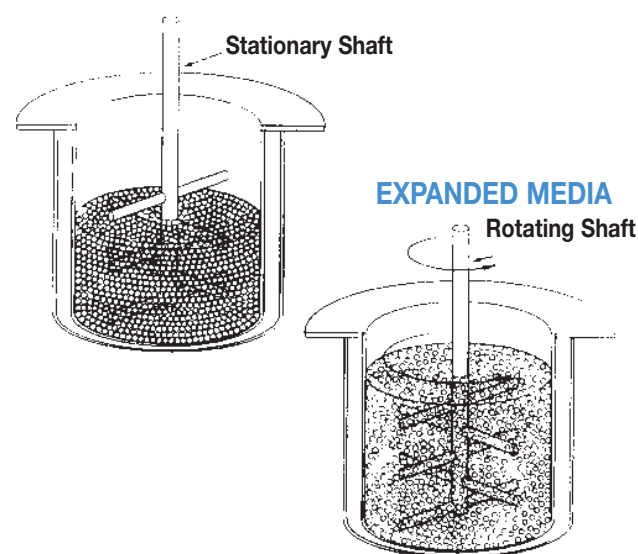
## The Dry Grinding Process

The Attritor dry grinding process is achieved in a stationary tank by means of a rotating shaft and arms that agitate the media into a random state of motion of internal porosity called kinematic porosity. In this expanded condition, the media and particles are free to move, collide and impinge upon each other.

### KINEMATIC POROSITY



### MEDIA AT REST





# SD SERIES

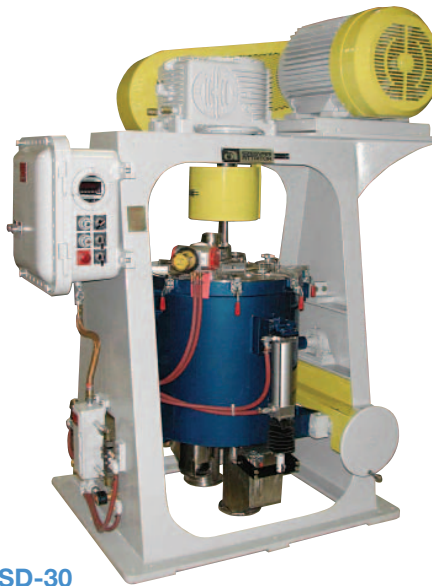
Union Process SD Dry Grind Attritors are ruggedly built machines with specially designed, two-speed, high starting torque motors. They are also equipped with jacketed, stainless steel tanks and tilting mechanisms for ease of cleaning and maintenance.

## Features and Options

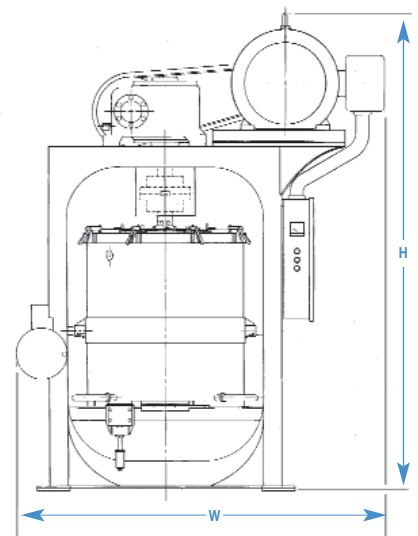
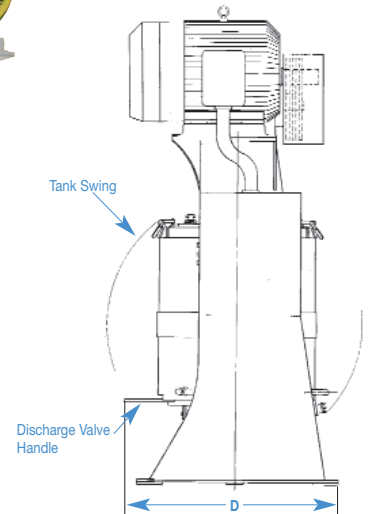
- All eight models can be outfitted to operate in either batch or continuous mode.
- All models equipped with ammeter.
- When metal contamination must be eliminated, tank liners and arm sleeves of tungsten carbide or various ceramics can be applied.
- Cover seals can be provided for conditions where dust control is desired, or where grinding must be done under a closed inert gas system.
- Torque meter is available including torque and speed sensor read-out.
- Media discharge valves can also be installed.
- Variable frequency drives and controls are available.



**SDL-50**  
Special cover with brush seal and vent and metering discharge valve assembly. 75 HP, variable frequency drive, TEFC electricals. CE Marked.



**SD-30**  
Sealed cover with ceramic-lined tank, zirconium oxide sleeved arms, and actuated discharge assembly. Explosion-proof electricals.



## ENGINEERING DATA

ATTRITOR MODEL	SD-5	SD-10	SD-15	SD-30	SD-50	SD-100	SD-200	SD-250
Gross Tank Volume (gals)	9	16	24	52	81	155	255	288
Material Capacity (gals)	2-3	4-6	5-7	10-18	15-25	30-50	60-100	75-125
Media Volume (gals)	5	9	12	25	37	75	150	187
HP*	5-10	10-20	15-25	25-60	40-75	60-125	125-200	150-200
Height (H)	79"	83"	86"	96"	104"	114"	126"	136"
Floor Space (W x D)	34"x68"	59"x41"	59"x41"	66"x44"	74"x48"	84"x58"	94"x64"	106"x68"
Machine Weight (lbs) w/o media	2000	2400	2800	3500-5500	4500-6000	5600-7900	11,000-14,000	14,000-16,000

VARIOUS TYPES OF CERAMIC LININGS ARE AVAILABLE FOR ALL MODELS

\* For ceramic media, less horsepower is required.

**On Cover:** Model SD-200 Dry Grinding Attritors with ASME coded cooling water jackets for special closed loop cooling system.

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# LAB MODELS



**SD-1**

The SD-1 Attritor is a versatile, reliable, rugged laboratory-size machine designed to meet virtually all lab grinding and dispersing needs – wet or dry, continuous or batch. It allows easy and precise scale-up to production-size equipment with reproducible results. It is also suitable for small production or pilot plant work. See our Laboratory Grinding Mills Brochure for information on the smaller 01-HD Series and a more detailed description of the many accessories and options available.



**HSA-1**

The HSA-1 High Speed Attritor is sized for laboratory and research studies. The HSA-1 works on the same principle as the production machines and discharges through a side screen and valve. For special applications, a ceramic-lined tank is available.

Standard power for all lab machines is 230/460V, 3 phase.						
Model	SD-1 Series				HSA-1 Series	
	Mechanical Drive		Electronic Drive		Mechanical Drive	Electronic Drive
Tank Capacity (gal)	1.5	2.5	1.5	2.5	1.3	1.3
Working Capacity (gal)	0.8	1.1	0.8	1.1	0.4	0.4
Media Volume (gal)	1.0	1.5	1.0	1.5	0.3 - 0.5	0.3 - 0.5
HP—Standard Dry Grinding	2 HP	3 HP	3 HP	5 HP	3 HP	5 HP
HP—DSM (mechanical alloying)	3 HP	5 HP	5 HP		—	—
Height (inches)	47		41		47	43
Bench Space (WxD in inches)	28 x 50		24 x 40	26 x 44	24 x 44	22 x 32
Machine Weight (lbs) w/o media	750	850	600	650	750	600

Both SD-1 and HSA-1 are equipped with variable speed drive systems (either mechanical or electronic) and tachometer to measure shaft RPM. All the grinding tanks are water jacketed.

## Common applications for Dry Grinding Attritors

- Ceramic powders
- Glass frits
- Metal powders
- Mechanical alloying
- Metal oxides
- Fibers and cellulose
- Food products
- Ferrite
- Pigments
- Minerals
- Coal and coke
- Graphite
- Plastics and rubbers
- Chemicals

# HSA SERIES

HSA Attritors feature a patented design concept that includes a unique grinding tank internal configuration which allows higher shaft speeds, finer grinding, and continuous operation with side discharge.

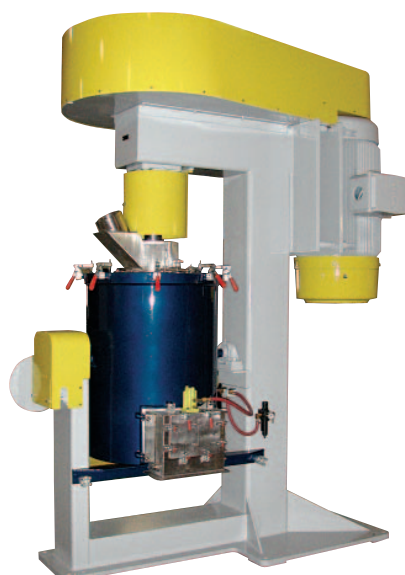
A series of specially shaped agitating arms and diverter discs are mounted along the longitudinal axis of the agitator shaft. This engineering design makes it possible to use smaller grinding media, operate at higher shaft RPM, and increase residence time of the material to be processed to insure a finer grind.

## Features and Options

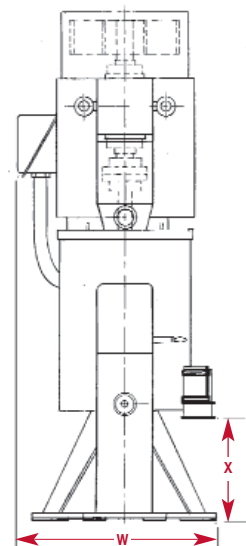
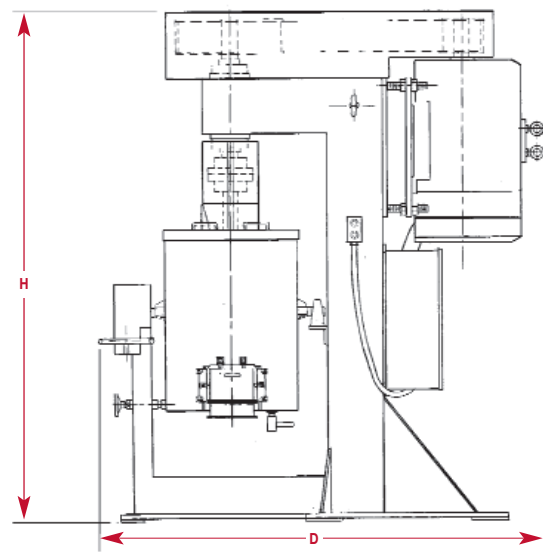
- Fully integrated system
- Stainless steel grinding chamber
- High speed, high volume production
- Equipped with ammeter
- Fully jacketed grinding tank for temperature control
- T.E.F.C. or explosion-proof electricals available
- Efficient side discharge
- Can be equipped with a metering pump for grinding aid
- Exceptionally fine grinding



**HSA-30**



**HSA-100**



ENGINEERING DATA					
ATTRITOR MODEL	HSA-10	HSA-20	HSA-30	HSA-50	HSA-100
HP	20	40	50	75	150
Gross Tank Volume (gal)	10.3	18.7	28.6	43.4	85.0
Media Volume* (gal)	3.8	7.6	11.4	19.0	38.0
Height (H)	87"	89"	91"	99"	113"
Floor Space (W x D)	65"x32"	73"x34"	76"x35"	91"x46"	98"x50"
Discharge Height (X)	21"	16"	13"	16"	16"
Machine Weight (lbs) w/o media	2600	3300	3700	5100	7400

\* May vary depending on application.

## The Union Process Advantage

From years of experience in designing and building thousands of Attritors for hundreds of applications, Union Process has developed the "know-how" needed to custom design units for specific requirements, whether for production or laboratory use, employing either a dry or wet grinding process. Union Process maintains a well-equipped laboratory and pilot plant where actual production conditions can be

simulated to assure that the Attritor we build for you will satisfy your requirements. Skilled technical service representatives are available for consultation. They can arrange visits to customer and prospective customer facilities to answer questions and provide solutions.

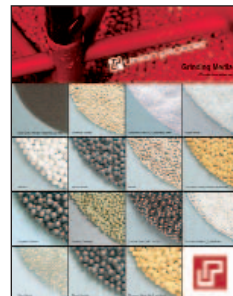


Installation of an HSA-100 for continuous fine dry grinding of calcium carbonate and barites.

### Grinding Media

Union Process offers a large selection of highest quality grinding media including stainless steel, chrome steel, carbon steel, ceramic, tungsten carbide, zirconium oxide, zirconium silicate, silicon carbide, silicon nitride, mulite and more. Most are available in different sizes to meet your specific grinding requirements.

A Union Process representative can advise you about which grinding media is best for your application.



For information on our broad line of grinding and dispersing equipment, please visit our website at [www.unionprocess.com](http://www.unionprocess.com).



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