

# POWDER BULK SOLIDS

The Source for Dry Processing and Bulk Handling Technology



## Should You Consider a Mobile Mill System?

Read more on page 12

### Feeders Spotlight

Metalfab Inc. offers Better-Weigh continuous feeders for gravimetric feeding of dry bulk materials.  
Read more on page 8



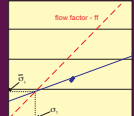
### Drive-Through Silos

When Franklin Industrial Minerals began a project to process chemical-grade limestone, the company needed additional storage.  
Read more on page 20



### Optimizing the Cost of Hoppers

New software, in combination with modern automated powder testers, demystifies hopper design.  
Read more on page 22



### Bulk Bag Filler

This basic bulk bag filler performs low-capacity filling operations at minimal cost. The unit can be upgraded with performance enhancements, including a

material delivery system integrated with the user's process equipment or bulk storage vessels. The Model BFB filler is a lighter-duty version of the heavy-gauge Twin-Centerpost filler. The unit features a patented design with two on-center posts that offers the structural integrity of four-post fillers, but at lower material and fabrication costs, and with less weight. It also affords easier access to the bag spout and loops. The filler is equipped with fill head height adjustment to accommodate all popular bag sizes, in addition to an inflatable cuff to seal the bag inlet spout, and a feed chute vent port for dust-free air displacement during filling.  
**Flexicon Corp.**, Bethlehem, PA 888-353-9426  
www.flexicon.com

### Pulverizing Systems

Powder King Anthem (PKA) series pulverizing systems have a streamlined look and provide increased production rates, low maintenance costs, and ease of operation. Features include: a direct-drive mill; HY-PRO disks; an advanced streamline mill design; pocketed disks mounting on flywheel and water jacket; segmented disk mounting clamps; disk gap adjusters that use one simple Allen wrench for gap setting; a PLC control panel with touch screen operator interface; multideck sifters; and a compact footprint.



**Powder King LLC**, Anthem, AZ 623-551-9897  
www.powder-king.com

# Fill one bulk bag per week or 20 per hour at the lowest cost per bag

*Flexicon's extra-broad model range, patented innovations and performance enhancements let you exact-match a filler to your specific cost and capacity requirements*

## FILLER FOR PALLET JACK BAG REMOVAL

Low profile version of patented TWIN-CENTERPOST™ filler allows removal of filled bags using a pallet jack, eliminating the need for a forklift or roller conveyor. Low cost standard models offered with many performance options.

## BULK BAG FILLER USES PLANT SCALE

Full length forklifting tubes allow positioning of this TWIN-CENTERPOST™ filler model on a plant scale as needed, allowing you to fill by weight without investing in load cells and automated controls.

## FILLERS WITH AUTOMATED FEEDING SYSTEMS

Every Flexicon filler is offered with pneumatic (shown) or mechanical (bottom right) feeding/weighing systems, as well as inlet adapters to interface with optional overhead storage vessels.

## COMBINATION BULK BAG/DRUM FILLER

Patented SWING-DOWN® filler features a fill head that lowers and pivots down for safe, easy bag spout connections at floor level, and a swing-arm-mounted chute for automated filling and indexing of drums.



## PATENTED SWING-DOWN® FILLER

Fill head lowers, pivots and stops in a vertically-oriented position, allowing operator to safely and quickly connect empty bags at floor level and resume automated filling and spout-cinching operations.

## CANITILEVERED REAR-POST FILLER

Offered with performance options including: powered fill head height adjustment, pneumatically retractable bag hooks, inflatable bag spout seal, dust containment vent, roller conveyor, and vibratory bag densification/deaeration system.

## BASIC FILLER FOR TIGHTEST BUDGETS

A lighter-duty version of the economical TWIN-CENTERPOST™ filler, the BASIC FILLER reduces cost further still, yet has an inflatable bag spout seal and feed chute dust vent as standard, and a limited list of performance options.

## PATENTED TWIN-CENTERPOST™ FILLER

Two heavy-gauge, on-center posts boost strength and access to bag hooks while reducing cost. Standard manual fill head height adjustment, and feed chute vent for displaced dust. Numerous performance options. First filler to receive USDA acceptance.

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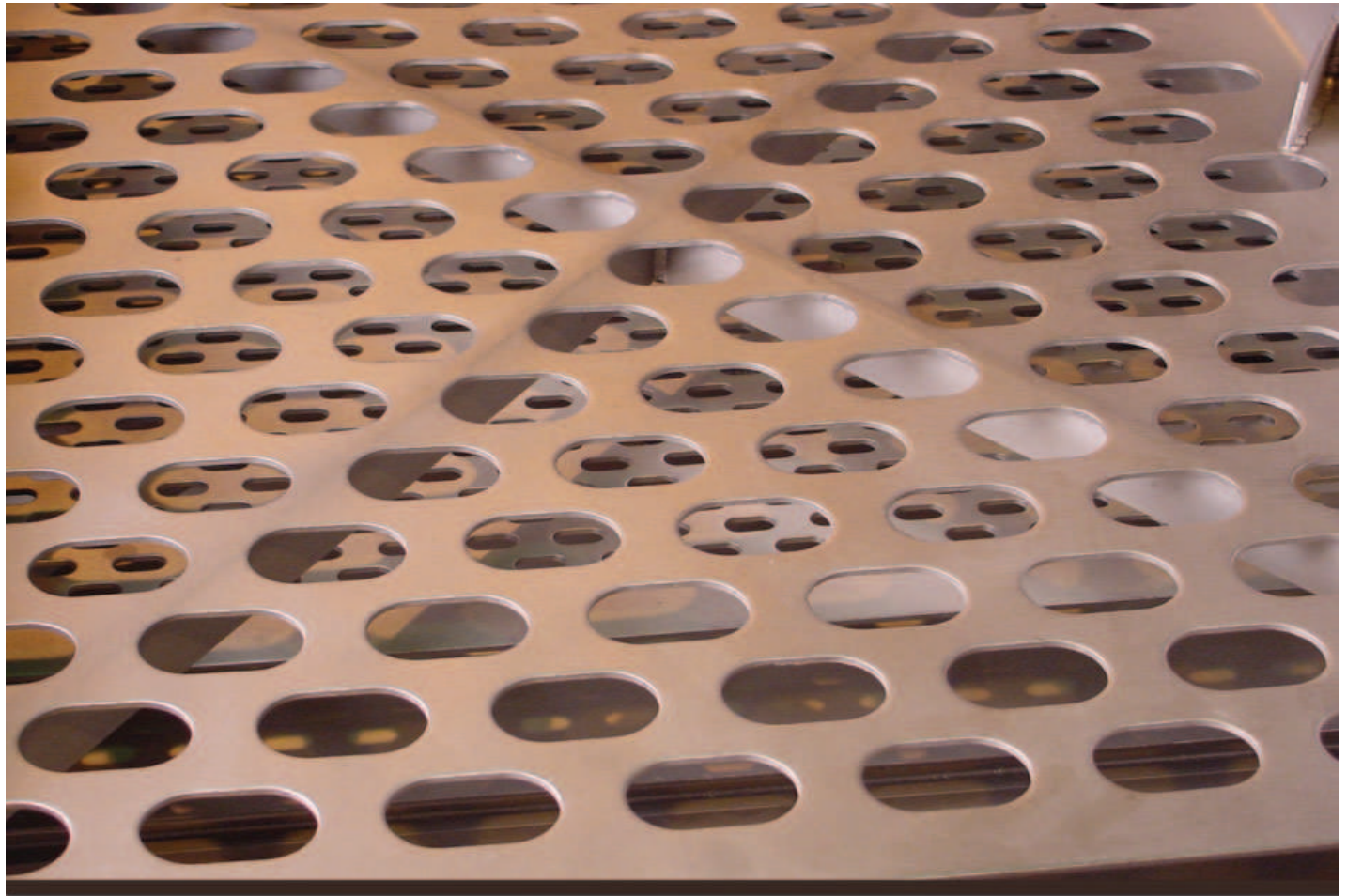


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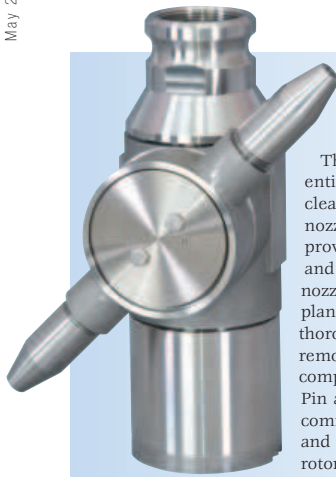
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May 2009



### Large Tank Washers

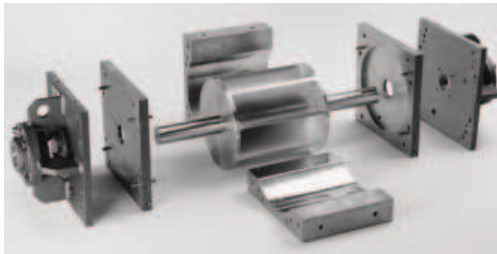
TankJet 4 tank washers provide high-impact cleaning of tanks up to 98 ft. They provide consistent impact over the entire pressure range to ensure superior cleaning. They are equipped with special nozzles that minimize turbulence and improve stream integrity for increased impact and greater cleaning effectiveness. The nozzles rotate 360° in horizontal and vertical planes, creating a crisscrossing pattern that thoroughly cleans tanks of even difficult-to-remove residues. The units are sleek and compact and fit in tank openings of 6.7 in. Pin and clutch versions are available to accommodate both permanent installations and portable operation. A variety of nozzle, rotor, and stator sizes are also available so the units can be easily customized based on application requirements.

**Spraying Systems Co.**, Wheaton, IL 630-665-5000  
www.spray.com

### Rotary Valve

The UltraValve complements the tough severe-duty PMV rotary valve line. It uses a case-hardening process that increases abrasion- and corrosion-resistance, while exhibiting high fatigue strength. Like other PMV rotary valves, this valve can be quickly rebuilt from off-the-shelf parts. It has been tested extensively in the most demanding applications.

**Precision Machine & Mfg. Inc.**, Eugene, OR 541-484-9841  
www.premach.com



### Vacuum Conveying

The VS series for vacuum conveying replaces the VR series and offers numerous upgrades, including improved module connection, a quick-change filter system, and improved discharge modules. There are also fewer moving parts, which optimizes performance. Key features include: a new and improved patented module system with common seals for more-efficient, easier cleaning and mistake-free reassembly; a new filter system with quick snap-on connection that combines radial and axial sealing, hygienic sealing, and no-tool assembly; and improved discharge modules that offer increased discharging diameter and external pneumatic drive. The

discharge modules allow for quicker release of material and no pneumatic parts inside the conveyor to contaminate material flow.

**Volkman Inc.**, Hainesport, NJ 609-265-0101 www.volkman.info/en

### Fusion Screens

Fusion screens were developed from a new technology that fuses the screen mesh to the tension ring. The screens have been designed to eliminate the use of adhesive, epoxy, or silicone in screen manufacturing, resulting in a unitary construction that minimizes the potential for contamination. Added benefits include precise repeatable tensioning and engineered uniform integral strain relief created from the complex robotic manufacturing process. Robotic manufacturing also results in faster turnaround for improved lead time and service. The screens are comprised of the gasket, strain relief, and screen frame as one molded part. As an option, a one-piece center disk with integral strain relief is also available for screens needing center support. The screens are available in standard Fusion and Fusion Plus construction. Fusion Plus has FDA-approved components for use in sanitary applications and higher temperature limits.

**Sweco**, Florence, KY  
859-371-4360  
www.sweco.com



### Compact Vacuum

The Nilfisk CFM 127 is a compact, intermittent-duty vacuum, designed with all the features of larger models. It is ideal for general cleaning, collection, and containment of fine powders and toxic debris in specialized applications. Other features and benefits include a large main filter that provides more surface area for filtering and resists premature clogging (optional upstream HEPA filter provides 99.97% efficiency, down to and including 0.3 µm); and an external filter shaker handle that keeps the main filter free of clogging dust and maintains the vacuum's maximum suction power and filtration performance. Suction performance is monitored by a manometer and light, which allows the user to know when the filter needs to be cleaned or replaced. A sound suppressor diffuses the exhaust air for optimum noise control; and it has a strong, solid construction with high-quality materials (steel, stainless steel, ABS plastic).

**Nilfisk CFM**, Malvern, PA 610-647-6420 www.stop-the-dust.com

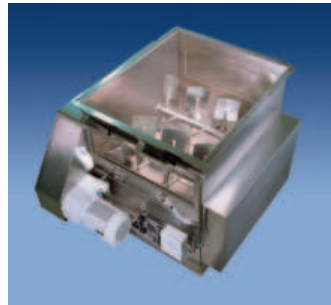


www.  
**POWDER  
BULK SOLIDS**  
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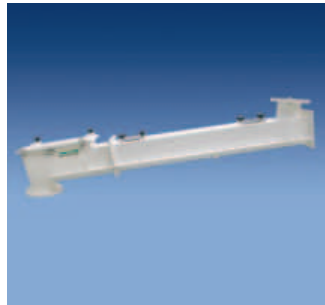
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**www.PowderBulkSolids.com**



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**Bella® Twin Shaft Fluidized Zone Mixer**

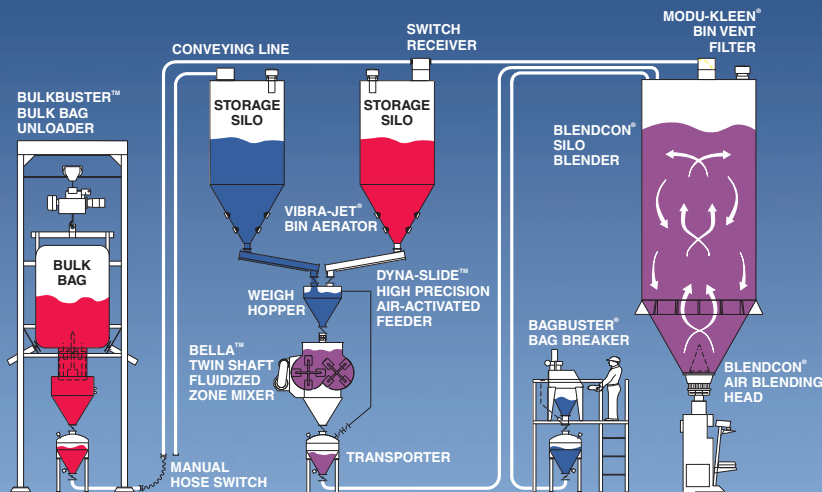


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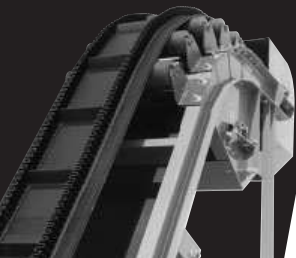
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## Industry Insight

# Choosing the Right Size Reduction Equipment

Thomas E. Warne  
warne@hammermills.com

There are almost as many different methods of performing size reduction on materials as there are materials themselves. Consequently, choosing the best piece of equipment for any given product can be a daunting task. The nature of the material, initial size, required particle size after processing, tonnage, and available space must be considered in the selection process. Focusing on preliminary and secondary grinding, I will look at some common types of equipment used for size reduction with the goal of narrowing this selection process.

Impact crushing: equipment that contains apparatus designed to deliver a severe blow to the material, causing it to shatter. Typical equipment falling into this category includes hammer mills, impactors, and certain types of lump breakers. Materials that lend themselves to this type of machinery include friable products, such as agglomerated powders, stone, glass, ceramic, and other brittle materials. Impactors are generally used when the feed stock is large and the tonnage requirement high. They are limited in ability to produce a fine material and are generally used as an initial step in processing. Hammer mills can accept a mid-size feed stock and can reduce most materials to granular or powder consistency if necessary. Particle size can easily be controlled when using a hammer mill by changing the screen size and rotor speed. Lump breakers are generally used to reduce agglomerated materials in order to make them flowable when a specific particle size is not required. They are most commonly found with either a dual shaft rotor assembly, or with a single rotor assembly with the blades passing through a comb.

The advantages of impact crushers are generally lower acquisition costs, low cost of replacement parts, simplicity, high production rates, and greatest control over particle sizing. Disadvantages include higher horsepower requirements, somewhat louder operation, and, with the possible exception of the lump breaker, the requirement for manual or metered feeding.

Compression crushing: machines that reduce the size of materials by squeezing the product between two surfaces, such as jaw and cone crushers. Compression crushers are most commonly used in the quarry industry for preliminary crushing of rock, but can be found in many other industries as well. A compression crusher is an ideal selection when the material to be crushed is fairly large and abrasive, and when a fine particle size is not required.

The advantages of compression crushing machines are their ability to process abrasive materials at high rates of throughput with minimal wear. Disadvantages include weight and girth of the equipment and minimal particle-size control.

Shredding: machines that rip or shred typically nonfriable materials, such as rubber, plastics, and metals. The two most common styles of shredders are dual-, counter-revolving-shaft designs, or single-shaft, ram-fed machines. Dual-shafted machines pull the material down between the two counter-revolving shafts. Single-shafted shredders have cutter teeth affixed to a solid rotor. A hydraulic ram pushes the material in the hopper against the revolving shaft. The teeth cut and pull the material down through an anvil featuring a zigzag pattern. Often shredders are provided with a sizing screen to control the output particle size. These machines operate at low speed and with high torque.

The advantages of these shredders are their ability to accept a hopper of material, lower horsepower requirements, ability to operate unmanned, and generally quieter operation. Disadvantages include higher initial cost, more costly replacement parts, and, in the case of the ram-fed grinder, lower production capacities.

Many of the pieces of equipment listed above can be used outside of their mainstream design. Hammer mills can act as shredders on some materials, while jaw crushers can be used as lump breakers. Often a combination of machines is the best approach. Jaw crushers or shredders are often used as the initial stage, followed by hammer mills for finish grinding. A combination of machines may be more practical and economical than trying to get one machine to perform multiple tasks that do not suit its capabilities.

When looking to purchase a piece of size-reduction equipment, remember the adage, "there's more than one way to skin a cat." With a little homework, you can find the equipment that will not only work, but work optimally.

Thomas E. Warne is president, CEO, and co-owner of Schutte-Buffalo Hammermill LLC (Buffalo, NY), which manufactures a wide range of size reduction equipment.



Thomas E. Warne

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Identifies minimum hazardous concentration of a dust cloud that will sustain combustions
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- ASTM E 2021 Hot Surface Ignition Temperature of Dust Layers - (AIT)  
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**Horizontal Shaft Impactor**

The Grand Slam secondary horizontal shaft impactor now features two new product developments: a new grinding path and an apron adjustment system. This impactor series uses high-chrome metallurgy to increase the wear life of machine components, thereby reducing metal replacement costs. Used for a wide variety of industrial applications including aluminum dross and brick, clay, shale, grog, refractory brick, ceramics, floor tile, glass, bakery waste, and scrap carbide recycling, the unit reduces material size more efficiently with maximum uptime. The Crush Plus grinding path system creates a third crushing chamber to maximize one-pass product yield, minimize oversize, improve material soundness, and produces highly cubical product. The Max-Yield automated apron adjustment system maintains gap setting adjustment for aprons and the grinding path. **Stedman**, Aurora, IN 800-262-5401 [www.stedman-machine.com](http://www.stedman-machine.com)



**Power Graters**

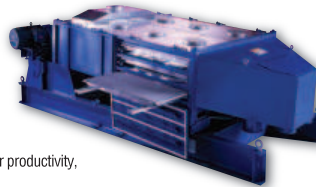
This family of power graters process soft to medium-hard products such as filter cakes, foodstuffs, plastics, and salts in nominal capacities ranging from 2 to 4 tn/hr. All models are available with motor options and low-speed drives for low operating sound levels. Various materials of construction—mild steel, stainless steel, Hastalloy, etc.—and screen sizes are also available to suit the mechanical and chemical elements of the application. Custom designs include sanitary construction, mount stands, and integrated controls. **S. Howes Inc.**, Silver Creek, NY 838-255-2611 [www.showes.com](http://www.showes.com)



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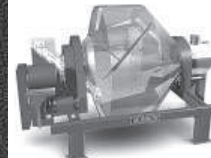
This equipment from Product Saver is designed for high-speed pre-processing and reclaim bag opening applications. It can accommodate multiple size bags and bundles up to 100 lbs. without equipment adjustment.

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## • Feeders

### Heavy-Duty Weigh Belt Feeders

High-capacity, heavy-duty MH and MDH weigh belt feeders accurately measure and control feed rates of up to 3000 tn/hr. Originally designed for the cement and steel industries, these models feed materials such as limestone, mill scale, dolomite, iron ore pellets, fluorspar, and coke. The feeders were also designed to withstand harsh environmental factors, such as abrasive dusts, corrosive fumes, wide temperature fluctuations, and vibrations, without any detrimental effects on performance or accuracy.

**Thayer Scale-Hyer Industries Inc.**,  
Pembroke, MA  
781-826-8101  
[www.thayerscale.com](http://www.thayerscale.com)



### Regrind and Powder Feeders

This company has now incorporated regrind and powder feeders for use on all sizes of its line of Guardian gravimetric batch blending systems. The feeders are both auger type for use with difficult-to-flow sheet regrind and ground up scrap from spews of off-spec parts, or a wide range of difficult to feed, powder materials. In most sheet, in-line thermoforming, and molding applications, customers need the capability of feeding up to 50% or more of ground scrap back into the process. By refeeding this material back through a gravimetric blending system, the amount of scrap can be controlled and recorded.

**Process Control Corp.**, Atlanta, GA 770-449-8810  
[www.process-control.com](http://www.process-control.com)

### Heavy-Duty Vibratory Feeders

These vibratory feeders are designed to smoothly convey products. Flow of material is adjustable and the flow rate can be variable or fixed. Available in electric- or air-operated models, the feeders can be designed with above-, below-, or side-mounted drives and can be arranged for base mounting or overhead suspension. The units come in custom vibrating trough lengths with special trough designs available. Feeders are available in several basic models including

air-operated light duty, air-operated heavy duty, twin-motor vibrating pan and grizzly feeders, electromagnetic, twin motor, and special-application feeders.

**Metso Minerals Industries Inc.**,  
Brunswick, OH 800-827-9237  
[www.metso.com](http://www.metso.com)



### Magnetic Belt Feeder

The MBF series magnetic belt feeder is designed to trap ferrous materials that would otherwise contaminate final products. Engineered to provide maximum elimination of metal contaminants, it consists of a belted conveyor with an integrated magnetic head pulley. As product reaches the end of the feeder's conveyor, it passes through a magnetic field. Any ferrous tramp metals adhere to the belt and are carried around the pulley toward the return side of the conveyor. Gravity causes clean, nonferrous materials to exit and fall away from the system. Ferrous metals are carried around the head pulley and are transported away from the magnetic field where they fall from the conveyor belt, typically into a metal collections area.

**Magnetic Products Inc.**, Highland, MI 800-544-5930 [www.mpimagnet.com](http://www.mpimagnet.com)



### Rotary Airlock Feeder

The Dust Collector Series (DCS) rotary airlock feeder is an economical valve suited for general use under dust collectors, cyclones, and hoppers. This feeder features eight-blade rotors, precision machining, and rugged cast iron housing for efficient operation. In a case where pressure differential exists, such as when feeding pneumatic conveying lines, this unit is best suited for feeding the material accordingly. These particular airlocks

maintain the highest level of performance for an extended period of time. The Quick-Take-Apart

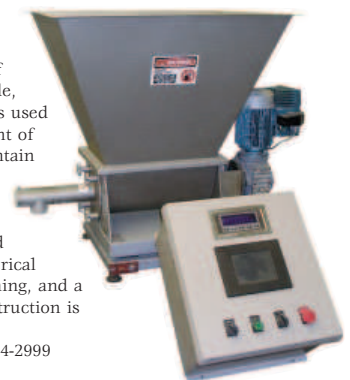
(QTA) series rotary airlock feeder is made for applications where frequent removal of the valve internals is required. This valve permits tool-less removal of the rotor and end plate as one piece, thereby eliminating the time-consuming step of gapping the rotor during reassembly. When encountering alumina, coke, fly ash, glass frit, and other highly abrasive products, the Ceramic Series rotary airlock feeder sustains its durability and achieves at least 3-5 times longer life compared with chrome and Ni-hard valves.

**Prater-Sterling**, Bolingbrook, IL 630-759-9595 [www.prater-sterling.com](http://www.prater-sterling.com)

### Batch and Continuous Feeders

Better-Weigh continuous feeders are used for gravimetric feeding of dry bulk materials where it is necessary to determine actual feed rates on a loss-of-weight basis. Available in seven models with feed rates from 1 to 550 cu ft/hr (larger sizes available), these units are designed to provide feeding in either batch or continuous mode depending upon the arrangement of the feeder's control electronics. In batch mode, the batch controller is used to control the fast (bulk) and slow (dribble) speeds of the feeder. Accuracies of  $\pm 0.5\%$  can be easily achieved in 2-lb or less batches, and  $\pm 0.25\%$  with 3-lb or greater batches with time spans of 30-90 seconds. In continuous mode, the feeder's electronic controller is used to constantly monitor loss-of-weight of material per time in order to maintain a continuous loss of weight with an accuracy of  $\pm 0.25$  to 0.50%. Standard features include a platform or lever balance scale, sealed tactile keyboard, seven-digit numerical keyboard, automatic manual batching, and a 2- or 5-cu-ft hopper. Sanitary construction is also available.

**Metalfab Inc.**, Vernon, NJ 800-764-2999  
[www.metalfabinc.com](http://www.metalfabinc.com)



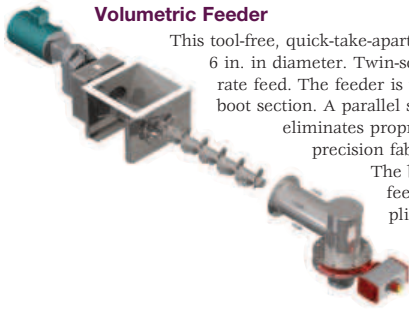
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[www.PowderBulkSolids.com](http://www.PowderBulkSolids.com)



## • Feeders

### Volumetric Feeder



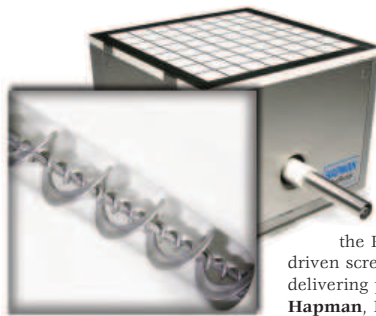
This tool-free, quick-take-apart volumetric feeder is available in sizes ranging from 2 to 6 in. in diameter. Twin-screw feeders up to 3-in. in size provide high-speed accurate feed. The feeder is modular in construction and features a heavy-duty inlet boot section. A parallel shaft gear reducer with an industry-standard C-face motor eliminates proprietary parts and provides a wide feed range. Every part is precision fabricated and is easily taken apart without the use of tools. The boot section has a flush bottom for positive draining. The feeders are suited for both volumetric and gravimetric applications. Many hopper and agitator modules are available. Units for food-grade applications are also available.

**HAF Equipment Inc.**, Centerville, MN 651-653-5098  
www.hafequipment.com

### Vibratory Feeder

Feeding up to 4 tn/hr, the Model 26C vibratory feeder is a rugged ac-operated unit for linear, accurate feeding of large quantities of bulk materials. This electromagnetic feeder provides a compact, robust design and can withstand significant material loading from hoppers or chutes, while maintaining consistent feed. These ac-operated electromagnetic feeders offer excellent feed adjustment and linearity to help optimize processes. This unit is commonly applied to plastics, grain, and chemical applications.

**Eriez**, Erie, PA 888-300-3743 www.eriez.com



### Screw Feeder

This screw feeder combines the versatility of flexible hopper technology with a 2-in-1 feed screw option that improves gravimetric batch accuracy. Historically, users have had to choose between speed and accuracy; a screw large enough to provide the desired batch speed also caused feeders to routinely overshoot the set point with varying results. Because the PosiPortion feeder actually uses two independently driven screws, situated one inside of the other, it is capable of delivering precision batches fast.

**Hapman**, Kalamazoo, MI 800-427-6260 www.ideasthatmove.com

### Composite Feeder

The AccuFeed uses molded composite components and a modular design to reduce cost and delivery time. Available in capacities up to 600 cu ft/hr, the patented unit employs controlled vibration to achieve volumetric accuracies of  $\pm 1$  to 2%. The machine disassembles quickly for cleaning and meets FDA and USDA sanitary requirements. Popular sizes are stocked for immediate delivery. AccuFeeds may be scale mounted for batch or continuous weigh feeding applications.

**Vibra Screw Inc.**, Totowa, NJ 973-256-7410  
www.vibrascrew.com



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