



The
Evolution
of
Milling
Technology



EXPANDING THE POSSIBILITIES FOR SIZE REDUCTION

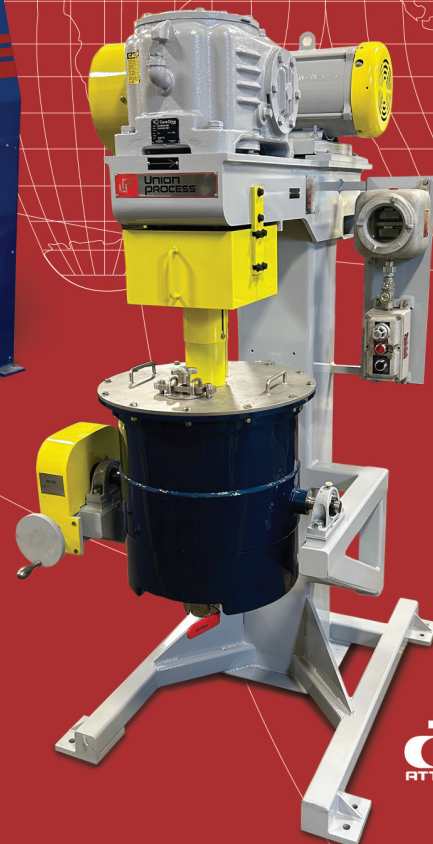
The Union of Chemistry, Engineering and Technology

UNION PROCESS®

Known globally as a premier manufacturer of grinding and dispersing equipment for a broad range of customers and applications, from international research institutes and universities to major corporations, Union Process designs and builds milling equipment, utilizing legendary, revolutionary Attritor technology. Expansion into the arena of bead milling augments the Attritor line with mills that use mini media to produce dispersions in the nanometer range.



DMQX
BEAD MILLING SYSTEM



ATTRITOR

From Need to Invention



As Dr. Andrew Szegvari prepared to display his new liquid latex process for making rubber goods at an exhibit in Paris, he needed an extremely fine sulfur dispersion to complete the vulcanizing process. Conventional ball milling methods in 1922 would have taken as long as a week to obtain the fineness he required. The problem...not enough time.

Szegvari hit upon the idea of using pebbles, a gallon can, a drill press, and a special agitator he designed for the drill bit to achieve a fine dispersion. In less than an hour, he invented an apparatus that would produce exactly what he needed.

That first apparatus, employing the dynamics of grinding media in random motion, marked the beginning of a new media milling technology, a process now known as Attritor grinding and dispersing.

In 1946, Dr. Szegvari founded Union Process, operating in a small plant in downtown Akron, Ohio. The new company's mission was to develop grinding and dispersing technology to help customers make fine dispersions quickly, reliably, and inexpensively.

The original Szegvari Attritor®, a batch machine, evolved into new machine designs—Continuous Attritors for online production, Circulation Attritors for very narrow particle size distribution and even small media mills for grinding to submicron or nano-range particles.

After more than 20 years of constant growth, the company moved in 1968 to its present location, a custom-built research, design, and production center just outside of Akron. This Midwest location provides convenient access for customers who choose to visit the Union Process headquarters.

Union Process Today

Scores of patents, refinements and advancements later, Union Process milling technology now plays a vital role for many Fortune 500 companies in a wide array of industries including chemicals and tungsten carbide. In addition, the foremost chocolate and confectionary processors, ink, paper, agricultural flowables, metal, magnetic oxide, coal, mineral, rubber, pharmaceutical, cosmetic and ceramic producers all employ Union Process milling technology.

Union Process maintains a global network of licensees and agents with the expertise to assess, analyze, sell and service customers' needs.

Whether it is manufacturing innovative laboratory mills for R & D or producing large mills capable of grinding tons of material per hour, Union Process is dedicated to remaining on the forefront of milling technology.

Today, in addition to building its line of grinding and dispersing equipment, Union Process maintains a tolling processing plant and research lab that helps companies develop and produce their products.



**The Evolution
of Milling Technology**

Specialized Size Reduction Solutions Tailored To Your Needs

Long before a grinding mill is manufactured, prior to any purchasing decision, and well in advance of actual material grinding, the experts at Union Process begin the work of solving a size reduction challenge. Only after data is gathered and analyzed are options offered to the customer.

1. Analyze...

To begin, Union Process analyzes the customer's size reduction requirements. From initial feed size and desired final particle size to chemical and physical properties such as viscosity, pH, temperature sensitivity, and handling precautions, all variables receive careful and thorough analysis. For efficiency, formulation adjustments may be recommended to achieve the optimum processing results. Contamination from grinding media and other wear components can be reduced to minimum levels by the selection of compatible materials of construction.

Evaluating grinding media is a critical part of the analysis. All Union Process grinding medias are tested for wear, consistency, reliability of manufacture and suitability for the specific milling application.

Union Process offers a complete choice of the best available media. Grinding media can be ordered at the same time as milling equipment, or obtained separately.

Once the analysis of the application is complete, Union Process makes its recommendation as to which specific grinding solution will best meet the company's needs. Union Process will consider the type of mill (small media mill or wet or dry grinding Attritor), size of mill (laboratory or production) or type of processing mode (batch, circulation or continuous).

2. Test...

Union Process performs a lab test on the customer's material in its fully equipped, technologically advanced on-site laboratory. Both wet and dry grinding laboratory mills are available for testing customer-supplied materials.

The results are then evaluated by the customer or analyzed utilizing advanced instruments and procedures available in the Union Process laboratory.

3. Evaluate...

Particle characterization techniques include laser diffraction, pore volume distribution, BET surface area analysis, high powered microscopy, moisture analysis, viscosity, and grind gauges. Torque and amperage may be monitored during the milling process to calculate power consumption.

The customer receives a detailed lab report that includes all test data, processing recommendations and estimated throughputs based on the customer's production requirements.

At this point, the customer may decide to proceed to larger scale evaluation of the material, utilizing the Union Process pilot plant. Union Process operates a fully equipped pilot plant facility which simulates actual production conditions. The pilot plant contains mid-size and full-size production equipment for conducting scale-up studies or to make larger quantities of test product.

4. Recomend...

Union Process helps customers choose the most cost-effective milling solution for their needs, based on test results, plant requirements, and desired production rates. If special engineering is required, Union Process' team of engineers can design custom systems to meet any process requirements or customer specifications.

5. Design...



6. Build.

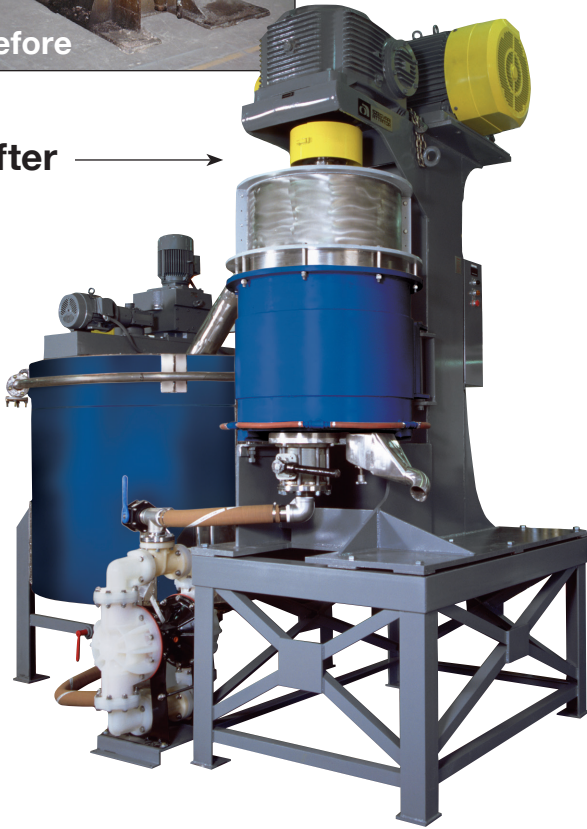




Before

Refurbishing can turn an old piece of equipment into "like new" at a considerable savings.

After



Services

Product Development, Equipment Refurb and Toll Processing

Working on a new product? Partnering with Union Process engineers and technicians on the front end can help you determine whether your material can be ground to the size that you need to meet your objectives. Union Process will also help a customer by looking at ways to optimize throughputs to maximize efficiency.

Equipment refurbishing (also referred to as rebuilding, re-manufacturing or reconditioning) is yet another solution offered by Union Process. For used Union Process equipment purchased on the secondary market or older models in need of reconditioning, enhancement or upgrades to present standards, the refurbishing process employed by Union Process restores equipment to "like new" condition. Combining authentic OEM parts and Union Process expertise, refurbishing equipment is an alternative choice where budgetary constraints do not allow for the purchase of a new mill.

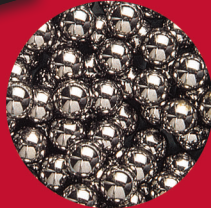
After the initial testing phase, customers may purchase a mill or choose to have Union Process "toll mill" the material for them. Toll processing agreements may be for a short-term product development project or for long-term production. Toll processing saves customers the cost of capital equipment, personnel, space and other costs associated with on-site manufacturing.

Toll processing utilizes the expertise of Union Process while saving the cost of a capital equipment investment.



Grinding Media

Union Process offers a full line of the highest quality grinding media available to meet most any grinding and dispersing requirements. Along with literature containing detailed specifications on the most common types of media, skilled Union Process technical service representatives offer consultation and assistance with the selection of media best matched to the equipment and the application to attain optimum end results.



Spare Parts

We understand the significance of genuine OEM parts in maintaining the optimal performance of Attritor Mills. By offering the highest quality OEM spare parts, Union Process ensures that our customers can rely on their equipment for consistent and efficient operation.

The spare parts quote request form simplifies the process, allowing you to easily access the quality components needed to keep your Attritor mills running at peak performance.

The product information needed is:

- Mill Model, Size, & Serial Number
- Material to be Milled
- Liquid Used (Wet Milling)
- Part Number(s) and/or Description
- Media Size & Type

The form can be completed on our website:

<https://www.unionprocess.com/other-products-services/refurbishing-and-spare-parts/#form>



Ink Union Process Rubber Inks

Backed by over 40 years of expertise, Union Process sells the highest quality rubber inks to companies worldwide. Designed for printing on natural latex rubber products, non-toxic rubber inks are ideal for silk screening and marking.

Available in a variety of colors, Union Process inks ship in either ready-to-use or concentrated form, depending on the type of ink. Additional information on Union Process Rubber Inks can be found on the web site or by contacting Ink Sales.



- Stamping Ink
- Concentrated Stamping Ink (100 series)
- Ready-To-Use Stamping Ink ("K" inks)
- Intensifiers (900 series)
- Silkscreen Ink (800 series)
- Marking Inks (200 series)

www.unionprocess.com

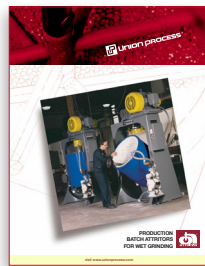
Check for the latest developments, a list of trade shows in which Union Process will exhibit, find your nearest Union Process rep or access technical articles or case studies. Organized, accessible product information and downloadable literature is available 24/7.

All Union Process literature is available online in PDF format. Simply go to www.unionprocess.com/resources/library

Attritors



Lab



Batch



Dry Grinding



Circulation



Continuous

Bead Mills



DMQX™ Bead Milling System



SDM Bead Mill



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