

POWDER & BULK SOLIDS

The Source for Dry Processing and Bulk Handling Technology



Key Features That Make a Mixer Easier to Clean

Read more on page 24

Predicting Mixing of Bulk Solids

Mixing of bulk solids is a critical operation in many manufacturing processes. One commonly encountered problem is a blender's poor performance caused either by a variation of the powder material properties or operating conditions.

Read more on page 6



Selecting the Right Blender

Mixing is a critical unit operation. There are dozens of blenders and many vendors that claim they can mix powder materials. However, which blender is the best choice for your material?

Read more on page 12



Bags, Bagging, & Packaging

American-Newlong's EC-201 robotic palletizer has a payload capacity of 440 lb and a palletizing capacity of 1600 cycles/hr. The EC-201 palletizes bags, cases, pails, etc., and has four axes for maximum flexibility.

Read more on page 16



Product Conditioner

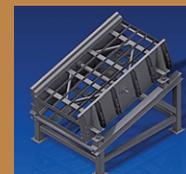
The product conditioner is ideal for de-lumping and de-agglomerating product prior to mixing. It has easy-to-remove screens and hinged side doors for easy cleaning. Other features include: 304 SS, sanitary construction; 12-in-diam, triple bar agitator; U-shaped product conditioner trough; removable screens; easily removable, perforated "screen" and frame assembly; hinged access doors to facilitate cleaning; direct-drive gear motor; inverter-duty, high-efficiency TEFC motor. Options include a hand add station and E-stop push button station. The screens are available in a variety of sizes depending on your product.

Eirich Machines Inc., Gurnee, IL 847-336-2444
www.americanprocesssystems.com

Automated Clamp Rail System

This patented hydraulically-operated opening and closing system for screen boxes is a fast, safe way to change out screen media, and can reduce change out time on three decks from 8-12 to 3-5 hours or less. With the push of a button, clamp rails on all or selected decks will hydraulically open. Once replacement media is in place, clamp rails automatically close simultaneously, while applying and maintaining just the right amount of tension evenly on all decks. This impacts operation in four ways: increases production time; improves safety; reduces premature breakage and out-of-spec product with proper, even tensioned screens; achieves greater product flexibility with the simplicity of changing screen media so quickly.

Smico Manufacturing, Valley Brook, OK 405-946-1461
www.smico.com



Key Features That Make a Mixer Easier to Clean

If a batch mixer is required to handle several different formulations, it is often necessary that the machine is easy to clean between batches to ensure individual batch integrity or to avoid the potential problems of batch to batch contamination. These issues often arise in pharmaceutical applications where batch integrity can be paramount, and in multi-product food manufacturing facilities where ingredients used in the same machine can vary from powder soup mixes to cake mixes. In all cases, the key to the question of easy clean out is, in the first instance, the initial machine design configuration, and second, ease and efficiency of operator access.

Mixer Selection

The machine design should start at the initial sales inquiry stage where the type of batch mixer to be offered by the machine supplier is considered against the application. There are several different types of

are employed across the different industries. These include dry cleaning using vacuum equipment, brushing, scraping, and air jet blowing, although in the latter case, careful attention to venting and filtration will be necessary to avoid the unwanted escape of dust. Wet cleaning methods will include high-pressure water or steam cleaning via fixed Clean in Place (CIP) nozzles, or hand-held lances. If, however, the machine requires wet cleaning between batches, consideration will need to be given to drying the mixer surfaces before the next batch is loaded, since this will often lead to the unwanted buildup of product as the dry powders stick to the wet surfaces. For this reason, cleaning between batches is more often confined to dry cleaning using vacuum, brushes, or scrapers, or a combination of all three. Wet cleaning tends to be more usually employed either at the end of a shift or campaign, or within automated processes.

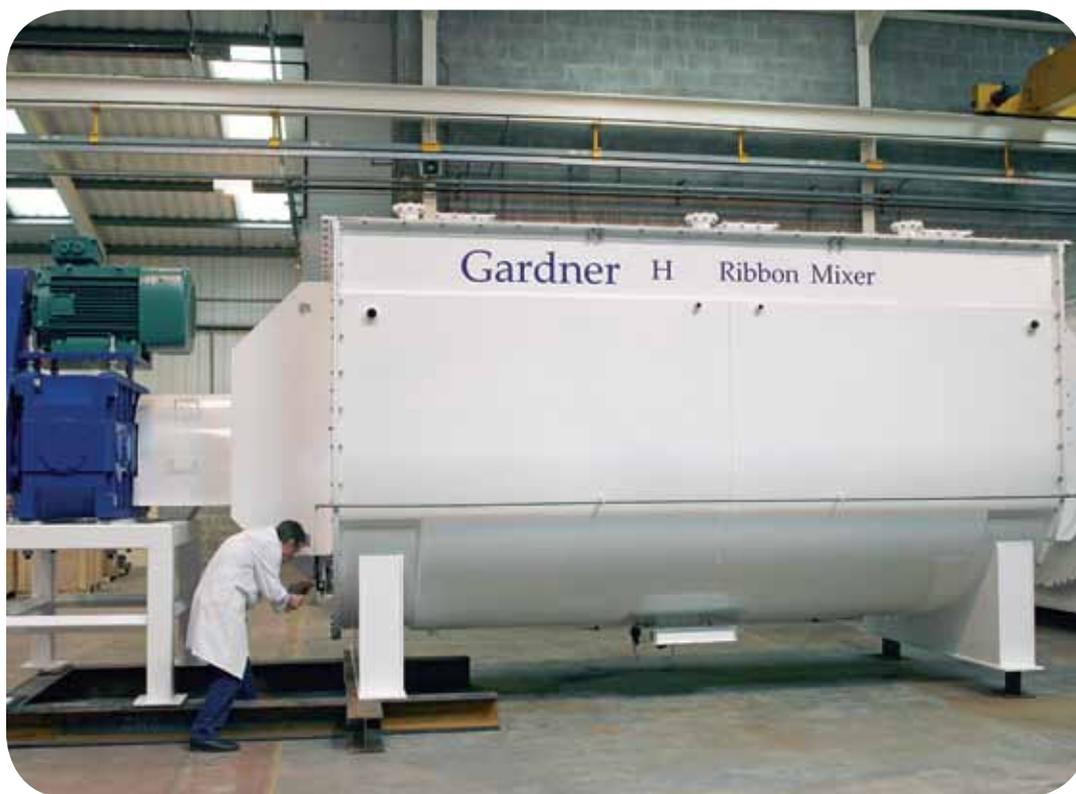
Horizontal vs Vertical Mixers

Considering the different types of batch mixer with regard to easy cleaning, horizontal mixers generally, and because of their design and configuration, offer perhaps the best potential for good access into the mixer vessel for either dry or wet cleaning. Vertical mixers can be less favorable than horizontal machines due to the limited access that can be provided, particularly to the lower end of the conical section. Rotating blenders present relatively uncluttered internal surfaces, and can therefore require less effort to clean. But, as with vertical mixers, access may be rendered more difficult by their shape, depending upon whether the machine in question has a rotating drum type or is a double cone type blender.

Once the machine type has been decided, then the question of access for cleaning can be considered. Generally speaking, the greater and simpler the access, the more efficient the cleaning activity will be. Regardless of the machine type, access to the internal product contact surfaces will usually be afforded via doors or hatches of one type or another. For simplicity and ease of operator access, the doors should ideally be side hinged and should be secured via manual catches rather than nuts and bolts. Nuts and bolts can be difficult, time consuming, and invariably will not be fully replaced after being removed. Also, and for ease of operation, doors should be either counterbalanced or lift assisted in some other manner using, for instance, gas-filled struts.

Easy Clean Features

For most types of mixers, it is a fundamental requirement that the doors or access hatches be safety interlocked to ensure that access cannot be



Gardner 18,000 L HE ribbon mixer

batch mixers, including horizontal mixers, vertical mixers, and tumbling blenders, and within each type of machine there are also variations of mixing element and geometry that will be best suited to the application. It will depend upon the knowledge and experience of the sales person to ensure that the most suitable machine is offered.

Part of the consideration in this initial machine selection stage will be an evaluation of the need and frequency of cleaning. Various methods of cleaning



Gardner K Series Cantilever Mixer with key operated safety interlocks.

permitted unless or until the machine is rendered safe, and that there is no possibility that any rotating mixing elements can be started while operator access and cleaning is taking place. This security is in most cases best achieved using a key type interlock with a separate rotary switch built into the mixer control panel that requires the key to be removed from the rotary switch before transferring to and unlocking the door, thus ensuring a built-in time delay that will allow the machine to fully run-down to stationary before the door is released.

Cleaning access doors should be designed and positioned according to both the configuration of the machine and its location within the process line.

Horizontal batch mixers offer the greatest potential for operator access either through safety interlocked top doors, or side-access doors, or if the machine incorporates a cantilevered agitator, via a pivoted end door, or for maximum access, a combination of all. Vertical mixers will generally have access doors in the top covers of the machine, and may also have side-access doors in the conical mixer bodies, although the shape of the cone sometimes makes this a little more difficult to achieve. Rotating blenders will often be fitted with access doors in the blender bodies.

Depending on the application, access doors fitted to the sides of mixer or blender bodies may be internally flush fitting. This expedient will reduce the tendency for product hang-up after discharge.

In all cases, where access doors are located in the body of the mixer vessel, as opposed to the top cover, then the proximity of adjacent steelwork, or other equipment needs to be considered to ensure that access to the mixer internal surfaces is not hindered.

In the design and positioning of all types of access doors, care should be taken to ensure that adequate access is afforded to reach and see all of the internal product contact surfaces of the batch mixer. Areas that are sometimes overlooked are the back of mixing blades on low-speed, low-energy mixers with spiral-type agitators, the feet of mixing shovels on high-speed plough-type mixers, and the underside of screw flights in vertical mixers. Careful design will avoid these "shadow" areas.

With horizontal mixers in particular, attention should also be given to the agitator shaft end seals. Depending upon the application, careful cleaning of the shaft seal areas will be important since product can lodge in this area and can therefore be a cause for concern. The standard sealing arrangement will incorporate packed gland assemblies that may also be air purged. This type of seal will require regular maintenance attention to ensure that it stays in good condition and perform as intended (i.e. doesn't leak). Alternative seal-

ing arrangements may be fitted that will require less attention, but usually at a higher initial price. These will include lip seals, semi-mechanical seals with polymer elastomer seal mechanisms, and traditional mechanical seals with metallic rubbing faces. Again, the most suitable type of seal will be recommended at the quotation stage, depending upon the application.

In summary, the key features that will make a batch mixer easier to clean between batches will be a combination of the following:

- * The most suitable mixer type for the given application
- * Well-designed and carefully positioned access doors or hatches
- * Shaft seal selection
- * Method and type of cleaning to be employed

For more information, contact Kemutec (Bristol, PA) at 215-788-8013 or visit www.kemutecusa.com.

Check out our **Equipment Zones** for news and articles at PowderBulkSolids.com



130 Wharton Road - Bristol, Pa 19007

215-788-8013

Sales@KemutecUSA.com

www.KemutecUSA.com