PNEU-CON PNEUMATIC CONVEYING, INC.

Glossary of Mixing & Blending Terms

Blending & Mixing Equipment

Continuous Muller. Series of two or more batch pan mullers. Used for solid/liquid mixing to form damp solids or pastes.

Extruder. Barrel-shaped vessel equipped with a single or double screw that creates enough pressure to extrude the molten finished mixture through a die, shaping it into strands, pellets, or a specific profile. Continuous unit is used for mixing and extruding plastics.

Gravity blender. Vertical vessel fitted with tubes or other devices through which material flows by gravity toward the outlet at the blender's base; material is blended either as it fills the blender or as it flows through the blender and discharges.

Kneader. Batch unit with two horizontal, counter-rotating, Z-shaped agitators positioned in a W-shaped trough. Used primarily for solids-liquids mixing to form pastes, liquids, and plastic masses with extremely high viscosities (over 100,000 centipoise). Also called a double-arm mixer, dough mixer or sigma-blade mixer.

Pan Mixer. Batch unit with flat-bottomed, cylindrical, pan shaped vessel equipped with agitator (such as large rotating wheels and scrapers) or scrapers and a rotating off-center agitator. One common design is a pan muller. Used primarily for solids-liquids mixing to form pastes.

Pin Mixer. Continuous unit with cylindrical vessel; vessel's single shaft rotates at high speed and is fitted with radial pins or narrow paddles. Used primarily for mixing a small amount of liquids with solids to produce micro-sized pellets or to de-dust incoming solids.

Pug Mill. Continuous unit that has a drum- or trough- shaped vessel equipped with a double-shafted (or, less often, single-shafted) agitator, with adjustable paddles mounted on each shaft. Can handle very large volumes and is often used for very crude solids mixing, such as preparing clay for brick-forming.

Ribbon Mixer (batch). U-shaped trough equipped with a rotating shaft typically fitted with metal spokes and helical blades called ribbons. Considered the workhorse of solids-solids mixing; can also blend small amounts of liquids with solids.

Ribbon mixer (continuous). Like the batch ribbon mixer, but longer and part of the process line. Commonly used for solids-solids mixing; can also mix solids with a small amount of liquids, as long as the finished mixture flows freely.

Tumbling mixer. Batch unit with a rotating vessel that tumbles ingredients to mix them. Rotation axis can be symmetrical or asymmetrical, and the vessel can be equipped with rotating, high-speed agitators to intensify the mixing process. Common vessel shapes include the double-cone vessel and twin-shell V-shaped vessel. Commonly used for solids-solids mixing, and sometimes used for solids-liquids mixing.

Twin-screw mixer. Continuous unit that is basically a pug mill, but manufactured to more exact tolerances and equipped with a very sophisticated twin-screw agitator, sometimes fitted with paddles. Commonly used for solids-liquids mixing to produce pastes and plastic compounds.

Vertical orbiting screw mixer. Batch unit that has an inverted-cone-shaped vessel equipped with a screw, which serves as an agitator. Can be used for almost all solids-solids mixing and for some solids-liquids mixing. Also called a conical screw mixer or Nauta mixer.

Mixing & Blending Operation

Additive blending. Combining two or more dissimilar ingredients in distinct layers and blending them to form a new product; often done in a gravity blender.

Batch mixing. Mixing relatively small amounts of ingredients in individual batches in a stand-alone vessel. All ingredients are loaded into the vessel and agitated for a relatively long period until they're homogeneously dispersed or mixed; the mixture is then unloaded.

Continuous mixing. Agitating and moving relatively large amounts of ingredients that are continuously fed through a process line mixing vessel in one quick pass. Agitation is usually intense. Mixture is discharged to the next equipment in the process line.

Mixture specification. Instructions for a mixing operator to follow to minimize mixture variability among different operators. Includes the list of ingredients to be added, the order in which each is to be added, and the speed at which each is to be added; can also include mixing speed, ingredient and operating temperatures, and other variables.

Premixing. Mixing a formula's minor or micro ingredients into a premix (also called a master batch) that is later added to the larger final batch; the process helps to uniformly mix the ingredients into the larger batch. Premix can also be formed of ingredients with extremely different characteristics (such as particle size or shape or moisture content).

Process-variable blending. Smoothing out variations in a process stream, such as changes in particle size and shape; often done in a gravity blender.

Segregation. Separation (un-mixing or de-mixing) of a mixture's ingredients, often the result of over mixing.

Mixture Sampling & Testing

Acceptable mixture variation. Content variation in a set of mixture samples that falls into an acceptable range for a required mixture.

Gross characteristics. Mixture characteristics (such as the appearance of a mixture containing a colorant) that are apparent without sampling and laboratory testing.

Sampling device. Instrument used to take material samples from a mixer. Common types include a thief sampler and a pneumatic lance.

Sampling interval. Time interval between samples; samples can be taken at several intervals throughout the mixing cycle to determine precisely when uniform mixing is achieved and thus determine the optimal mixing time.

Sampling specification. Detailed instructions explaining how and where an operator will take samples from a mixer to minimize sampling differences between operators and between batches.