

TECHNOLOGY BRIEF:

This bulletin presents some basic guidelines for proper scale-up of Ribbon Blender processes.

Scale-up of Ribbon Blenders



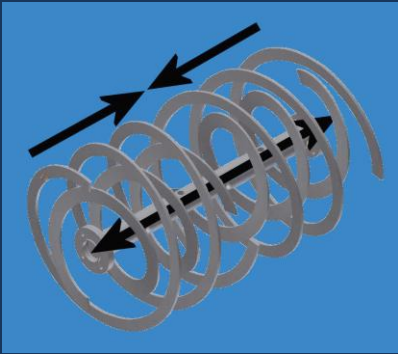
Large scale ribbon blending

The classic batch Ribbon Blender is used extensively across many industries for mixing dry powders, granules, pellets and various other solid forms. Typical applications range from spice blends, baking mixes and food supplements to polymer blends, composite fillers and pharmaceutical powders. A truly versatile device, the Ribbon Blender can also function as a paste mixer, vacuum dryer, granulator and even a coater (wherein solid particles are evenly coated with a minor liquid component or very fine powders).

This style of blender mixes product within a U-shaped trough via a horizontal agitator with inner and outer helical ribbons precisely pitched to move materials in a well-balanced axial and radial flow pattern. High quality Ribbon Blenders feature tightly controlled clearances between the trough surfaces and agitator tips. Good blender construction and fabrication contribute to fast and thorough mixing.

The Ribbon Blender normally achieves complete mixing within a short time — in many cases, 15 minutes or less — especially for ingredients with similar particle sizes and bulk densities. Its reliable, rugged design can be built for capacities over 1,000-cu.ft. and requires minimal maintenance. In addition, compared to other types of blending equipment, the Ribbon Blender is usually the more affordable option in terms of initial capital cost. The price gap becomes more significant as the blender size goes up. For these various reasons, manufacturers commonly rely on the Ribbon Blender for large-scale mixing requirements.

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How ribbon blenders work

Ribbon blenders consist of a U-shaped horizontal trough and an agitator made up of inner and outer helical ribbons that are pitched to move material axially, in opposing directions, and also radially. This combination promotes fast and thorough blending. Tip speeds in the range of 300 feet/min are typical.

Click [here](#) to see a ribbon blender in action. Or visit the www.ribbonblenders.com

Some scale-up tips to consider

- Know your product's accurate bulk density. The desired batch volume (not mass) determines the size of the blender but bulk density determines horsepower and if a standard or heavy-duty model is required. Most standard blenders can typically handle bulk densities around 35 lbs/cu.ft. Heavier-duty Ribbon Blenders are available for denser products.
- Determine the quantity of full and partial batches that can be made on a particular blender model to accommodate fluctuations in product demand. Remember that optimal mixing in a ribbon blender requires enough batch material – equivalent to at least 30-40% of the rated volumetric capacity. Working with smaller volumes, the blender may fail to generate adequate contact between the agitator and the product.
- Based on successful trials on your laboratory or pilot-scale Ribbon Blender, try to maintain the same tip speed on the larger unit. The appropriate rpm setting should produce good turnover in all areas of the blender. Yet, the ribbon agitator does not always have to run at full speed, especially with friable or sensitive ingredients or when generation of fines is not desirable. Do anticipate longer mixing times as power per unit volume decreases.
- Ribbon blenders directly driven by a gearmotor (one-piece motor reducer) are generally recommended over belt- or chain-driven designs. Low-maintenance gearmotors work extremely well with electronic inverters which provide variable speed, overload protection and adjustable starting torques.
- For pilot projects involving an unproven product, the Ribbon Blender may be specified conservatively, with just the minimum features required to achieve the desired product quality. But when the product has taken off enough to justify scale-up, design the blender for the long haul. Consider optional upgrades such as pneumatically-operated dust-tight valves and covers, bag dump stations, high polish on internal surfaces and PLC controls to facilitate faster loading, discharge and clean-up. A well-equipped production-scale blender will offset upfront costs through tremendous savings gained from higher throughput and lesser downtimes.
- Partner with a mixer supplier with extensive experience in designing and building large-scale Ribbon Blenders. Just as importantly, communicate your needs as thoroughly as possible. Companies are often tight-lipped about the nature of their application because they are concerned about confidentiality, but this can come at a cost. Incomplete information could prevent the design engineer from recognizing the business context in which the blender will operate. To ensure that your supplier can contribute the full value of their collective experience, take the time to map out your strategies – rather than strictly working on a project-to-project basis. More than just taking your orders, a dependable supplier can help engineer your success.