



RELIABLE BY DESIGN



A review of different mixing, blending and leveling options from paddles to ribbons

Comparing Agitator Solutions for Food Processing Applications

Several agitation solutions are available in the Mepaco® portfolio of processing equipment. In this white paper, compare agitator options and learn best practices for various applications and processes.

Equipment With Mixing/Blending Agitators

- ThermaBlend® Cookers
- Mixer-Blenders
- Mixer-Cookers
- Mixer-Grinders
- Drop Tanks
- Thermal Screw Cookers

Equipment With Leveling Agitators

- Clean Sweep Surge Loader
- Auger Pumping Systems
- PosiFlo Automatic Chub Feeder

ThermaBlend® with
Single Agitator



Agitators for Mixing & Blending

Single Shaft with Dual Ribbons

This agitator has an inner and outer ribbon on a single shaft.

Applications: Used for self-leveling products such as soup, stews, slurries, spices and other dry ingredients.

Equipment: Mixer-Blenders, ThermaBlend® Cookers and Drop Tanks

Best Practices: This agitator style offers homogeneous blending with self-leveling food products. At slower speeds, it can provide consistent blending and ingredient suspension.



A single shaft with dual ribbon agitator is shown inside an industrial cooker with electropolished finishes

Single Shaft with Ribbon/Paddles

This agitator has inner paddles with an opposing pitch to the outer ribbon.

Applications: Used for soups and sauces, and also used for products that are more viscous such as stew, chili, paté and other slightly stiffer products.

Equipment: Mixer-Blenders, ThermaBlend® Cookers and Drop Tanks

Best Practices: The addition of the outer ribbon creates a more efficient method of conveyance during the mix cycle as well as the discharge cycle, compared to a single agitator with paddles only.



Single Agitator with Ribbon /Paddle Flights

Single Shaft with Dual Paddles

This agitator has inner and outer opposing paddles on a single shaft.

Applications: Used for soups, sauces and similar products.

Equipment: Mixer-Blenders, ThermalBlend® Cookers and Drop Tanks

Best Practices: The dual paddle flights create a more aggressive flow compared to a single ribbon agitator, keeping particulates suspended and the batch homogenous.



Single shaft agitator with dual paddle flights showing scraper system

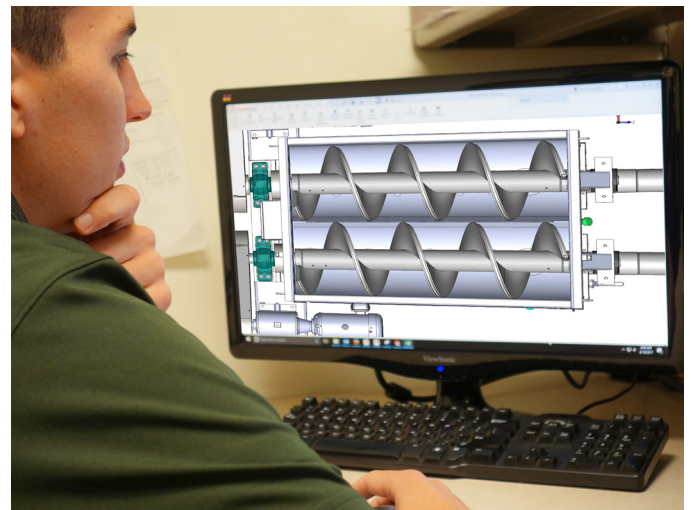
Single or Double Shaft Thermal Screw

These agitators are driven by chain and sprocket with a rotary union for steam or hot/cold water to be circulated through the shaft and cavity of the flights.

Applications: Used for slurries and other products where heat transfer is required.

Equipment: Thermal Screw Cookers and Mixer-Cookers

Best Practices: Thermal Screw agitators offer gentle blending in applications where additional product contact heat transfer is required for the product.



Double shaft thermal screw shown in 3D Solid Works layout

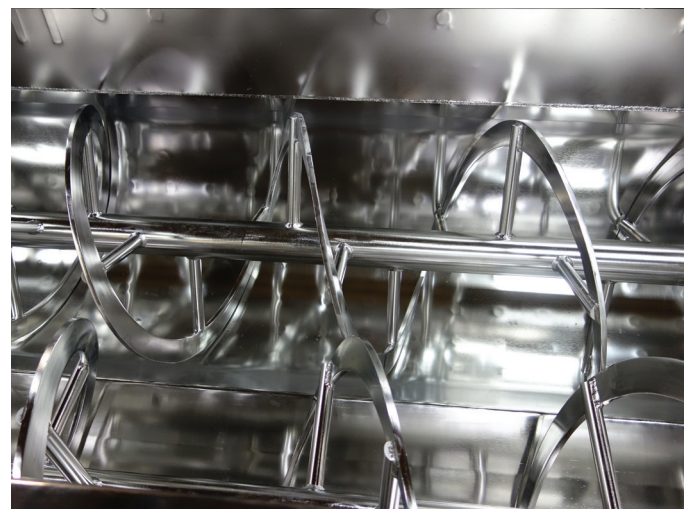
Double Shafts with Ribbon

These agitators rotate while transferring the product in a clockwise and counterclockwise direction. Ribbons provide gentle agitation and superior discharge efficiency and effectiveness.

Applications: Used for processed cheeses, dips, spreads, fruit fillings and similar types of blended food products

Equipment: Mixer-Blenders and ThermaBlend® Cookers

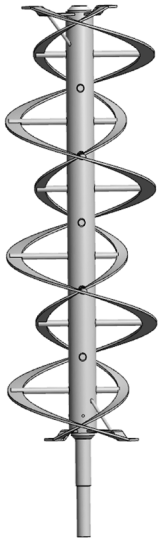
Best Practices: Ribbon agitators produce a low-shear homogenous blend and is especially effective when unloading challenging products that are dense and viscous.



Double side-by-side ribbons with electropolished finish



Single Shaft with Dual Ribbons



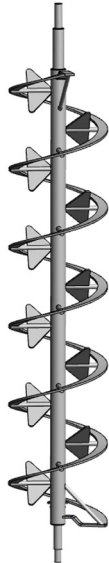
BEST PRACTICES

This agitator style offers good blending with self-leveling food products like soups, stews, pet food, spices and other dry ingredients. At slower speeds, it can provide good blending and ingredient suspension.

APPLICATIONS



Single Shaft with Ribbon/Paddles



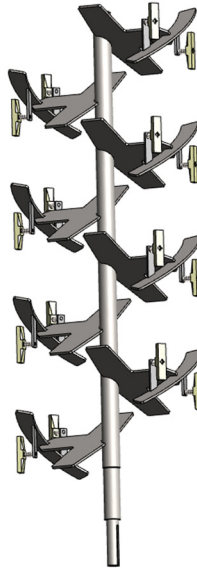
BEST PRACTICES

The paddle and outer ribbon configuration creates a more efficient method of conveyance during the mix cycle as well as the discharge cycle.

APPLICATIONS



Single Shaft with Dual Paddles



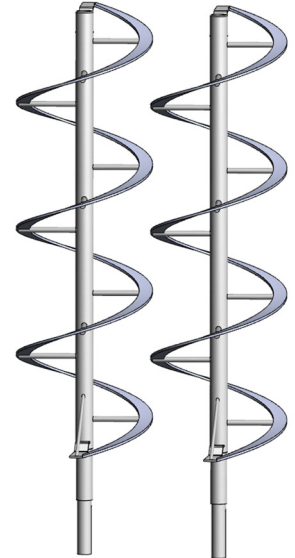
BEST PRACTICES

Best used in ThermoBlend® Cooker or Blender when a homogeneous blend is required

APPLICATIONS



Double Shafts with Ribbon



BEST PRACTICES

Best used when products can tolerate or require a higher level of shear, compared to single shaft dual ribbon agitators

APPLICATIONS

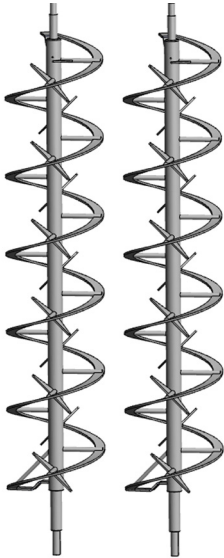


TERMS

- Bridging** Bridging is a condition when the product is not flowing into the auger screw for discharge. For example, a large piece of meat might bridge across the flights of the screw augers, preventing that piece from getting into the flow of the discharge.
- Barreling** Barreling is a situation where the product continues to tumble without a change of position or a possibility of flowing through the discharge.
- Particulates** Small pieces of ingredients in a soup or stew are particulates. Diced or sliced carrots, peas, onions, potatoes, apples are examples of particulates.
- Trim** Trim beef has been deboned and the chunks are typically smaller than 1 ½ ft. long.
- Shear** Shearing is a process that makes ingredients smaller.
- Self-Leveling** Food product that doesn't need additional force or leveling to enter the auger or discharge.



Double Shafts with Ribbon/Paddles



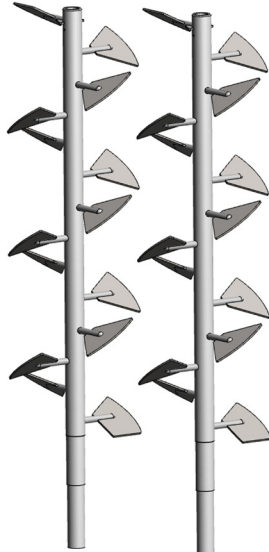
BEST PRACTICES

Best used for processed food products that have many particulates requiring a good homogeneous blend

APPLICATIONS



Double Shafts with Paddles



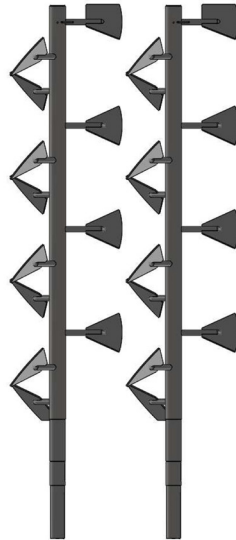
BEST PRACTICES

The dual shaft, paddle agitators create an accurate blend for protein products that require additional processing. Provides accurate blending, reduced batch cycle times and temperature rise.

APPLICATIONS



Double Shafts with Overlapping Paddles



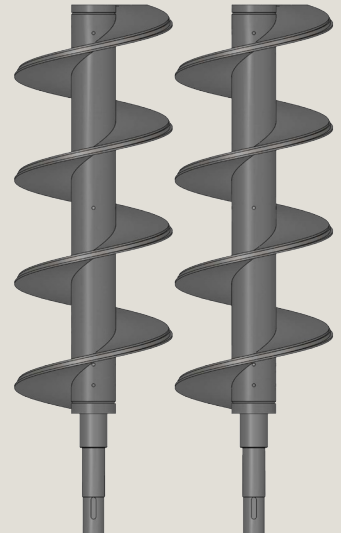
BEST PRACTICES

For quick mixing of proteins (with or without additives) that require accuracy or protein extraction with minimal standard deviation.

APPLICATIONS



Single or Double Thermal Screws



BEST PRACTICES

The Thermal Screw agitators offer gentle blending in applications when it's advantageous to have the additional heat transfer surface in contact with the product.

APPLICATIONS



LEVELING OPTIONS



Clean Sweep Upper Agitator

The Clean Sweep Surge Loader is equipped with either a paddle style upper agitator for lean/fat trim as shown on the left,



or a ribbon style upper agitator for ground products, shown in this photo.

Both are effective mechanisms for eliminating bridging and priming the transfer screw.



Leveling Ribbon

Auger Cart pumping systems feed viscous products to the inlet of a pump. The Leveling Ribbon prevents bridging and roll-back by distributing the product evenly to the auger(s).

Double Shafts with Ribbon/Paddles

These agitators are similar to the standard dual ribbon agitators with the added benefit of the inner mixing paddles. While maintaining superior product transfer during the mix and discharge cycles, the inner paddles provide additional mixing action for a more accurate batch.

Applications: Used for dips/spreads, sauces and pastes.

Equipment: Mixer-Blenders and ThermaBlend® Cookers

Best Practices: This double agitator system offers a dynamic flow of components with varying densities to help transfer and distribute the ingredients equally throughout the batch.



Single Agitator with Ribbon /Paddle Flights

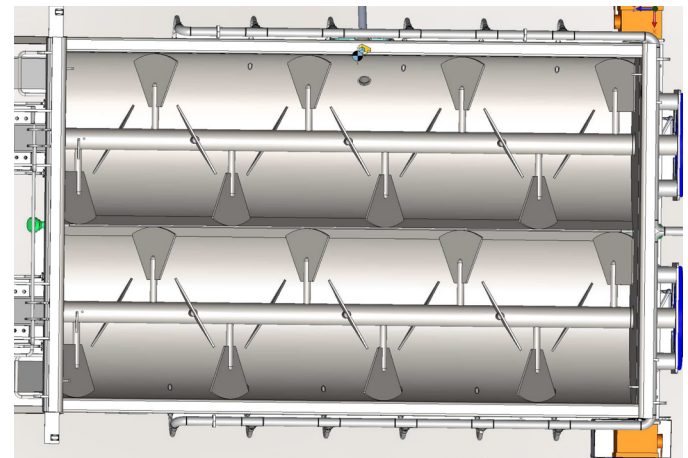
Double Shafts with Paddles

These agitators are more aggressive than ribbons and provide an accurate mix in a shorter period of time. Depending on speed, standard paddle agitators are also good for extracting protein.

Applications: Used for sausage, processed meats and other ground meats and poultry products.

Equipment: Mixer-Blenders

Best Practices: These double shaft, paddle agitators create an accurate blend for a variety of protein processing applications. This solution provides the next in progression after ribbon agitators for accurate blending with reduced batch cycle times and temperature rise.



Double paddle agitators in 3D Solid Works layout

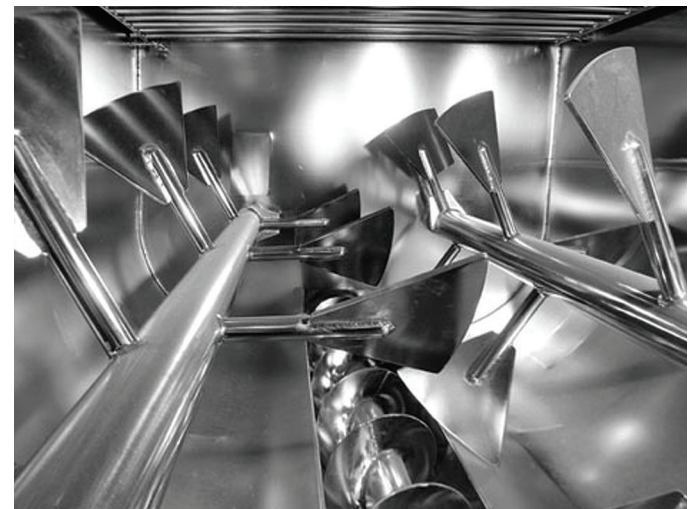
Double Shafts with Overlapping Paddles

These agitators are intermeshing and work in unison with a bottom discharge screw. Overlapping paddle agitators provide the most accurate blend with the shortest batch cycle time compared to other agitator combinations.

Applications: Ground or emulsified beef, pork, chicken and turkey products

Equipment: Mixer-Blender, Mixer-Grinder

Best Practices: For quick mixing of proteins (with or without additives) that require accuracy or protein extraction with minimal standard deviation.



Double Overlapping Paddle Agitators

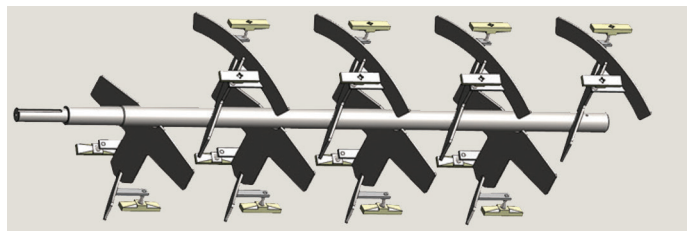
Agitator Design Provides Homogeneous Blending Throughout Batch Cooking and Cooling



In the process of manufacturing fruit pie filling, this ThermaBlend® first cooks the product to 185°F; then cools it to the proper filling temperature of 75°F.

The cook step and the chill step take approximately 30 – 40 minutes each, which is critical to maintaining product integrity and reaching the production goals of this application.

The agitator design is a single shaft with dual paddle configuration. The opposing pitch paddle design provides a gentle push and pull of the pie filling



ingredients with minimal shear. The patented scraper system prevents product burn-on during the cooking cycle.

While focusing on production, yields and product integrity, the ThermaBlend® provides an effective solution with key features, including:

- Agitator design that provides homogeneous blending while minimizing shear
- Dual zone ASME wrap-around heat jacket for full or partial batches
- Proven effective, patented scraper system
- Electropolished, non-stick product surface
- Flexible controls to optimize the performance of the ThermaBlend®

Customized Solutions Begin with Specifying Single or Double Agitators

There is one question that helps define whether the equipment will require one or two agitators: “Will the product level without mechanical aid?” If so, it is likely that a single shaft option would be sufficient for the application. If the product bridges or mounds, then two shafts may be required.

After the single or double configuration is determined, the next step is determining the volume requirements for the application. This will dictate the size of the equipment.

Agitators and tub design are customized according to the volume and process requirements. There is a range of agitator widths and lengths available that are specified for applications ranging from 1 Ft³ to 300 Ft³ Mixer-Blenders.

Variable Frequency Drives (VFDs) are recommended for applications that warrant speed and directional flexibility. Other applications may only require a single speed and reversing starters to achieve the proper batch blend.

The speed of the agitators and sequencing (Fwd/Rev) can also have an impact on the consistency of the blend. Depending on the application, Mepaco can recommend speeds and proper sequencing based on our expertise.



One of Mepaco's fabricators putting finishing touches on a leveling ribbon



In production, this single shaft paddle agitator is staged for electropolishing before being installed in an 8000 lb. mixer.

Mepaco®, part of the Apache Stainless Equipment Corporation Family

The Apache Stainless Equipment Corporation employs technicians and artisans in the fabrication of stainless equipment for a range of industries. Our expertise in stainless and high alloy fabrication is shown on Apache's tanks and vessels as well as in the Mepaco® line of food processing equipment.

Apache consists of four business groups: Large ASME tanks, small portable vessels, contract manufacturing and Mepaco®. With modifiable options, the Mepaco® product line includes: thermal processing equipment, mixers, blenders, augers, dumpers, sanitary conveyors and material handling systems.

Mepaco® began in 1932 and has always been known for grinding and blending systems. In 1993, Mepaco® was purchased by Apache Stainless Equipment Corporation. Under the Apache umbrella, Mepaco® continues to manufacture meat processing machines with the resources of a large commercial manufacturer and expertise in working with stainless steel for industries with sanitation compliance.

The tenured sales and engineering teams in the Mepaco® group are driven and dedicated to solving production problems for industrial food processing customers. Our specialists have an average of 20 years of experience from application support to equipment fabrication that form an effective team to provide performance solutions.

As a 100% employee owned company, Apache's culture exemplifies continuous improvement, efficiency, innovation and commitment to our customer.

This white paper was developed with the collaboration of Mepaco's senior engineering team and application experts, with reference to Apache's archives.

Mepaco®

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