Blending Silo Techniques for Bulk Material Handling Systems

Fuller® Random Flow™ System

Central Inverted Cone

Airmerge™ Blender

Column Blender

Flushing Silo Techniques for Bulk Material Handling Systems

www.fls-pt.com

Up-to-date addresses of worldwide subsidiaries and sales offices are available from our website.

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Computerized data acquisition systems permit continuous recording of variables including pressure drop, air volume, power consumption and material flows. Complete capability of evacuating materials to determine the most energy-efficient and cost-effective system design parameters also exist. Varying process conditions can be simulated in the laboratory, so that the effect on the conveying system can be observed prior to actual installation. Worst-case scenarios can be identified and designed for, thereby eliminating costly down-time.

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Flushing Silo Techniques for Bulk Material Handling Systems

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A fully fluidized cone, an upper and lower air plenum and an open-ended central column allow the principle of air blending to be applied to even the most difficult materials.

The fluidizing air enters the cone beneath the column, reducing the density of the material within which is displaced upward as the denser material from the annulus of the cone flows inward.

This “Fountain-Flow” gives a radial circulation capable of blending attrition prone, coarser sandy, materials and products with a wide particle size distribution.

Features:

- No moving parts
- Gravity discharge 60° cone design
- Simple operation
- Robust design
- Greater flexibility in particle size range
- Design for different batch sizes available

* Different Batch Sizes

By dividing the central column into two or more separate pipes, the column blender can accommodate different volumetric batch sizes.

In the smaller batch, material is lifted up in the same way but “Fountain-Flow” into the surrounding fluidized bed via the spaces between the upper and lower columns. Batch volumes must be known for design purposes in advance.

Materials Testing

FLSmidth’s world-class R&D facility near Bethlehem, PA enables us to demonstrate both the Airmerge™ and Column Blenders on your materials prior to contract.

- Size Analyses
- Moisture Content
- Bulk Density
- Angle of Rest
- Bed Expansion
- Air Flow/Pressure
- Airslide Angle
- Conveying Tests

Come to FLSmidth and avoid costly site trials and possible rework.

Column Blender Catasauqua, PA

Materials Testing

Materials Testing and Research

Multi-unit receiving and transfer stations allow full-scale testing and material evaluations.

Modular equipment assemblies facilitate test programs.
BLENDING TECHNIQUES

BLENDING APPLICATIONS

- Mixing two or more products
- Segregation of individual products
- Size uniformity
- Color uniformity
- Chemical uniformity
- Temperature uniformity
- Reduce process variation
- Recycle out spec material
- Add trace elements
- Chemical modification

Experience counts... at FLSmidth we engineer our blending silos to industrial customers worldwide over the past 70 years. Our technology and commitment to product development and testing have made us the #1 supplier of silos worldwide.

Central Inverted Cone

Central Inverted Cone—Air Assisted Gravity Blending. Multiple outlet gravity discharge combined with central cone construction gives advanced gravity blending and storage with a proven consumption as low as 0.25 to 0.5 kWh / metric ton of cement raw meal.

Features include:
- Total cleanout
- High capacity (6,000 ton+)
- Complete cleanout
- Usually PD blowers
- Simple operation
- Low pressure air
- No complicated controls
- Gentle blending action

Benefits of Airmerge Blenders

- No moving parts in contact with the material
- Simple operation
- Gentle blending action
- Low pressure air
- ~20° slope on fluid bed

Airmgerge Blenders™

Airmmerge Blenders are designed for batch or continuous operation to meet your requirements. Perforated baffles held with blending strips on top of removable grating panels in the Air Plenum allows access for fag to be replaced in place. Larger air velocities in the blending quadrant lower the bulk density causing the denser materials in the three fluidized quadrants to flow down and be displaced upward in a continuously circulating bed.

Air for fluidization and blending can be supplied from common or separate blowers as required.

Scope of supply can include:

- Airslide™ Gravity Conveyor
- Aerated Bin Bottoms
- Fuller® Random-Flow™ Silos
- Control Panels
- Diverter Valves
- Flange Connections
- Fan & Blower Packages
- Pneumatic Conveying
- Dust Collectors
- Compressor Packages
- Flexible Conduits
- Piping and Brackets
- Control Panels

Typical support arrangement showing loadcell option.

Features:
- No moving parts in contact with the material
- Simple operation
- Gentle blending action
- Low pressure air
- ~20° slope on fluid bed
- Gentle blending action
- Low pressure air
- ~20° slope on fluid bed

Reliably simplified.

Aerated Bin Bottoms

Airmmerge Blenders™ Gravity Conveyors

Reliability. Simplified.

Whichever you need, a complete option or just a component, let the engineers at FLSmidth put their resources to work for you.

Our attention to detail will make it work.
BLENDING TECHNIQUES

BLENDING APPLICATIONS
- Combining two or more products
- To ensure uniformity of individual product
- To improve the performance of blends

Central Inverted Cone
- Air-Assisted Gravity Blending
- Multiple outlet gravity discharge
- Central inverted cone construction gives advanced gravity blending and storage with a low power consumption as low as 0.25 to 0.5 kWh / metric ton of cement raw meal.

Central Inverted Cone
- Maximum storage capacity
- Maximum cleanout
- Flexible plant layout
- No segregation
- Low power usage
- Clean, dry, oil free
- Reduced maintenance

Aerated Bin Bottoms
- Air slide discharge
- Fan and blower packages
- Pneumatic conveying
- Dust collectors
- Solids flow control valves
- Control panels

Air blending is achieved by use of a porous membrane over the entire bin bottom, if air plenums and a simplex flow control system enable.

Features:
- Low maintenance
- Long life
- No complicated controls
- 100% autonomic loading
- Usually VFD blowers
- Complete cleanout

Features:
- No moving parts in contact with the material
- Simple operation
- Gentle blending action
- Low pressure air
- ~20° slope on fluid bed

Aermimage Blenders™
- Air blending is achieved by use of a porous membrane over the entire bin bottom, if air plenums and a simplex flow control system enable.

Materials handled include:
- Chemicals
- Additives
- Recycle out specified material
- Temperature uniformity
- Chemical uniformity
- Color uniformity
- Size uniformity
- Homogenization of multiple materials
- Mixing two or more materials

APPLICATIONS
BLENDING
- Chemical modification
- Add trace elements
- Recycle out specified material
- Temperature uniformity
- Chemical uniformity
- Color uniformity
- Size uniformity
- Homogenization of multiple materials
- Mixing two or more materials

Airmerge Blenders can be designed for batch or continuous operation to meet your requirements.

Features:
- Complete cleanout
- Usually PD blowers
- Little dynamic loading
- No complicated controls
- Long life
- Low maintenance

Aermimage Blenders™
- High capacity (6,000 ton+)
- Reduced foundation cost
- No segregation
- Minimum dust collection
- Reduced silo profile
- Controlled flow withdrawal

Features:
- No moving parts in contact with the material
- Simple operation
- Gentle blending action
- Low pressure air
- ~20° slope on fluid bed

Aermimage Blenders™
- Air blending is achieved by use of a porous membrane over the entire bin bottom, if air plenums and a simplex flow control system enable.

Features:
- No moving parts in contact with the material
- Simple operation
- Gentle blending action
- Low pressure air
- ~20° slope on fluid bed

Scope of supply can include:
- Aerated Bin Bottoms
- Aermimage™ Gravity Conveyor
- Airslide™ Airslide Conveyors
- Bag & Boxer Packages
- Dust Collectors
- Pneumatic Conveying
- Compact Compact
- Feeders
- Control Panels

Typical support arrangement showing bottom outlet option
BLENDING TECHNIQUES

BLENDING APPLICATIONS

- Mixing of new products
- Remelting of individual products
- Size uniformity
- Color uniformity
- Chemical uniformity
- Temperature uniformity
- Reduce process variation
- Recycle-out spec material
- Add trace elements
- Save valuable resources

Six pie-shaped sectors (each subdivided into six aeration zones) and continuous blending in a timed discharge pattern provide the lowest power consumption as low as 0.07 kWh / metric ton of cement raw meal.

Central Inverted Cone

Central Inverted Cone—Air Assisted Gravity Blending. Multiple small outlet gravity discharge combined with central cone construction gives advanced gravity blending and storage with a proven consumption as low as 0.25 to 0.5 kWh / metric ton of cement raw meal.

Features include:

- No moving parts
- Low pressure air
- Compact, dry free
- Low power usage
- Space on ground floor
- No segregation
- Gentle blending action
- No moving parts in contact with the material
- Simple operation
- Gentle blending action
- Low pressure air
- ~10° slant on feed bed
- Easy design construction
- Batch or continuous working
- Standard and DIA fabricated option

Experience counts

FLSmidth has delivered over 550 blending to industrial customers worldwide over the past 70 years. Our technology and commitment to product development and testing have made it the #1 supplier of silo blending technologies in the world.

Materials handled include:

- Chemical modification
- Add trace elements
- Recycle out spec material
- Reduce process variation
- Temperature uniformity
- Chemical uniformity
- Size uniformity
- Homogenation of multiple materials
- Mixing two or more materials

Aermotor® Blenders

Air blending is achieved by use of a porous membrane over the entire bin bottom, if air plenum and a single flow control system enable. Together they change the density of material in the fluidized bed of material to generate a gentle folding action and a near perfect blend.

Benefits:

- Low maintenance
- Long life
- No complicated controls
- “Auto” automatic loading
- Usually DFS blowers
- Complete cleanup
- New or retrofit installations
- System design flexibility
- Total applications available

Features:

- No moving parts in contact with the material
- Simple operation
- Gentle blending action
- Low pressure air
- ~10° slant on feed bed
- Easy design construction
- Batch or continuous working
- Standard and DIA fabricated option

Typical support arrangement showing loadcell option

Scope of supply can include:

- Aermotor® Bin Bottoms
- Aermotor® Gravity Conveyors
- Aermotor® Air Assisted Gravity Blenders
- Air & Blower Packages
- Dust Collectors
- Pneumatic Conveying Components
- Pipelines and Fittings
- Control panels
Column Blender

A fully fluidized cone, an upper and lower air plenum and an open-ended central column allow the principle of air blending to be applied to even the most difficult materials.

The fluidizing air entrains the cone beneath the column, reducing the density of the material within which it is displaced around as the denser material from the annulus of the cone flows inward.

This “Fountain-Flow” gives a radial circulation capable of blending attractive powders, coarse sandy materials and products with a wide particle size distribution.

Features:
- No moving parts
- Gravity discharge 60° cone design
- Simple operation
- Robust design
- Greater flexibility in particle size range
- Design for different batch sizes available

Materials Testing

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FLSmidth’s research programs are aimed at maximizing the energy-efficiency and cost-effectiveness of pneumatic conveying systems. Test configurations are designed and equipped to permit full-scale testing under precisely controlled laboratory conditions. Flexibility allows operators to go from vacuum to pressure in combinations of the lengths and pipe diameters.

Computerized data acquisition systems permit continuous recording of variables including pressure drop, air volume, power consumption and material flow. Complete capability of evaluating materials to determine the most energy-efficient and cost-effective system design parameters also exist. Varying process conditions can be simulated in the laboratory, so that the effect on the conveying system can be observed prior to actual installation. Worst-case conditions can be identified and designed for, thereby eliminating costly downtime.

Column Blender, Catasauqua, PA

Materials Testing and Research

Columns in FL range and avoid costly site trials and possible rework.

¢ Different Batch Sizes
- By dividing the central column into two or more separate planes, the column blender can accommodate different volumetric batch sizes.

In the smaller batches, material is lifted up in the same way but “Fountain-Flow” into the surrounding fluidized bed via the spaces between the upper and lower columns.

Batch volumes must be known for design purposes in advance.

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Materials Testing

A fully fluidized cone, an upper and lower air plenum and an open-ended central column allow the principle of air blending to be applied to even the most difficult materials.

The fluidizing air enters the cone beneath the column, reducing the density of the material within which is displaced upward as the denser material from the annulus of the cone flows inward.

This “Fountain-Flow” gives a radial circulation capable of blending abrasive powders, coarse sandy materials and products with a wide particle size distribution.

Features:
- No moving parts
- Gravitational discharge
- Simple operation
- Robust design
- Greater flexibility in particle size range
- Design for different batch sizes available

In the smaller batches, material is lifted up in the same way but “Fountain-Flow” into the surrounding fluidized bed at the points between the upper and lower columns. Batch volumes must be known for design purposes in advance.

* Different Batch Sizes

By dividing the central column into two or more separate pieces, the column blender can accommodate different volumetric batch sizes.

Materials Testing and Research

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