



Revolutionize Battery Material Processing

Advanced Dry Coating for
Enhanced Performance



A Division of *Spraying Systems Co.*



MAXIMIZE YOUR MATERIALS

OPERATIONAL FLEXIBILITY ENSURES PEAK PERFORMANCE FOR HIGH-SHEAR COATING MIXERS

Whether you need wet or dry coating and blending technology for R&D, pilot or production-scaled applications, Fluid Air can help. Our high-shear mixers ensure homogeneity, uniformity, and precision in coating applications. They can be quickly and cost-effectively customized to meet your unique processing challenges, providing reliable and efficient solutions for your battery material needs. Fluid Air's state-of-the-art facility is equipped with machines at different scales enabling accelerated testing for concept developing, full production scale-up, and cost-effective customization for special requirements.

Let us help you solve your most problematic particle engineering challenges.

ENGINEERING EXPERTISE TO:

- Accelerate your scale-up
- Minimize batch carry-over
- Optimize production
- Reduce maintenance
- Improve product quality
- Uniformly control material temperatures
- Control quality with critical instrumentation and controls
- Customize features to meet your unique process requirements
- Reduce waste and increase yield
- Save time and resources

TECHNOLOGY

What is High-Shear Coating?

High-shear coating is an effective way to coat a seed material with a smaller coating material by evenly distributing the coating material over the seed material using high shear rotational forces to produce a homogeneous blend. Binders either in the wet or dry form can be added to stabilize the blend for downstream processing.

Powders are added to the mixing bowl and the bowl is sealed. A large vertically driven bottom horizontal impeller rotates with high tip speeds creating a spinning vortex of the powders. A horizontal intensifier tool immersed in the vortex simultaneously disrupts the pattern; forcing material down into the impeller to reorient the particles. After the powders are blended together, a liquid or dry binder may be added to the product. The binder can be activated using a solvent, heat, or simply blended in for activation in a downstream process.

When coating, the product can be activated using heat with an optional temperature-control jacket. If thermal activation is not desired, or the materials are temperature-sensitive, the energy introduced through the tools can be removed with the temperature-control jacket. Other options such as vacuum drying with gas assist, screening operations, and automatic material loading and unloading further enhance the coating process.

EFFICIENT GRANULATING AT UP TO 90% BOWL CAPACITY

OPTIMIZED PROCESSING OF BATTERY ACTIVE MATERIALS WITH HIGH-SPEED, HOMOGENEOUS MIXING TO ACHIEVE REQUIRED SPECIFICATIONS

Fluid Air's high-shear coater has a mixing bowl with a bottom-driven high-speed mixing impeller and side-mounted chopper. The bowl geometry is optimized to permit working volumes from 30-90% of full capacity.

High-speed impeller equates to high tip speed for more homogeneous mixing. The speeds of the tools can be varied using variable frequency drives in most cases.

Mixing Impeller System



EFFICIENT, HOMOGENEOUS MIXING—EVEN AT LARGER CAPACITIES

CREATING A QUALITY PRODUCT

Quick loading/unloading of materials is possible with minimal handling. The dome-shaped lid permits product to perform a complete rollover as it moves up the side of the vessel wall. This ensures efficient mixing even when running at larger operating capacities.

Dome Lid

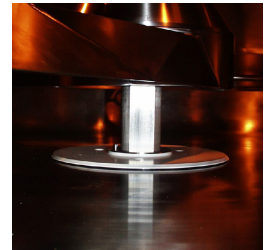


REDUCE DOWNTIME BETWEEN BATCHES

MINIMUM BATCH CARRYOVER

Fluid Air high-shear granulators efficiently evacuate batches with an automatic discharge system. Smooth surfaces free of ledges or voids ensure efficient removal of most material from the process vessel with little operator interaction. Features including the liftable impeller tool, purged seals, easy-access lid, swing-away discharge, and tool-free disassembly make certain that operators can easily inspect the systems between batches if needed to ensure minimum batch carryover or cleaning between lots. For example, the liftable tool system raises the impeller 4-8" to permit inspection and ensure no residual material on the impeller, seal and bowl bottom, reducing downtime between batches. No removal of the mixing impeller is required.

Liftable Tool System

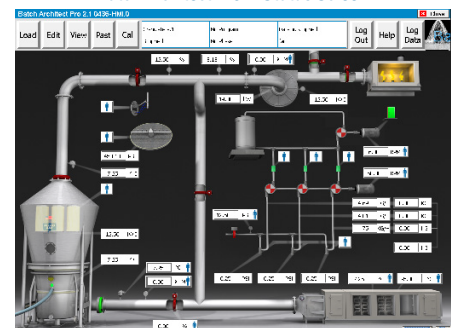


EASY-TO-USE BATCH ARCHITECT

PROCESS CONTROL SOFTWARE MAXIMIZES OPERATING FLEXIBILITY

- Simple enough for R&D-scale machines
- Configure for manual control or optional phase- or recipe-based control
- Runs on Allen-Bradley® Logix processors, RSLogix™ 5000 Software, PanelView Plus™ or FactoryTalk® SE Platform
- Custom controls/automation "handshaking" with upstream or downstream processes

Batch Architect Pro™ Status Screen



Allen-Bradley is a trademark of Rockwell Automation.

SYSTEM ADVANTAGES

- Optimized bowl geometry and mixing efficiency permit operation up to 90% capacity for larger batches
- Equipped with liftable tool systems for easy changeover and inspection
- Robust variable-speed chopper and impeller-drive systems for maximum energy transfer
- Consistent impeller tip speed for all models ensures scale-up
- Flexible bowl configurations available to match all your processing needs
- Elliptical vessel lids promote homogeneous mixing action
- Temperature-control vessels
- Optional high heat/ultra-low chilling packages available
- Virtually dust-free contained loading/unloading
- Optional solvent-compatible processing with explosion-proof designs
- On-site Field Engineering team ensures proper installation, supervision, commissioning, and qualification
- Process lab for pre-purchase trials, process optimization, process validation, commissioning, and qualification
- Cost-effective spare part management

SPECIFICATIONS: FLUID AIR HIGH-SHEAR GRANULATING MIXER SYSTEMS				
Model Number	1	100	600	1250
Total bowl volume (L)	2, 6, 13	119	633	1286
Charge - max. liters @ light bulk, 0.3 - 0.5	1.8, 5.4, 11.7	107	569	1157
Charge - min. liters	0.6, 1.8, 3.9	30	159	324

**Specifications vary depending on bowl size.*



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