Aeromatic-Fielder
High Shear Processor

Advanced technology for efficient production of blended powders, granules and pellets
Aeromatic-Fielder high shear granulation technology comprises of two ranges; the versatile, modular GP GENERAL PROCESSOR™ and the popular PMA PHARMA MATRIX™. All systems are available in sizes from laboratory-scale to volume production, with process options to suit.

Controls
System control options range from simple, manual, push-button control to full programmable logic controller (PLC) - based automation. Industry standard communications ensure full compatibility with existing control strategies, networks and plant-wide supervisory systems. Designs compliant with 21CFR Part 11 are also available.

End-point control
A choice of automated end-point control facilities, with trending for process optimization, is offered with all of the system control options - manual as well as PLC-based. Options include fixed process time, automatic end-point control based on power consumption, and a high-accuracy torque-based system. Both the power- and torque-based options can be used to optimize the spray rate, for faster, more uniform granule growth.
**Loading**

*Gravity loading*
Simple open / close ports are used to dispense product into the mixing bowl. For potent powders, split-valve technology provides full isolation during loading.

*Vacuum loading*
Faster loading can be achieved using vacuum technology. Aeromatic-Fielder’s innovative killed-vacuum technique makes for easy operation and maintenance, as it requires only a standard-sized filter.
A continuous vacuum loading option, requiring a large filter, is also available, as well as a suck-and-dump system.

**Binder solution addition**

*Nozzle*
A range of nozzles are available to give the optimum binder liquid droplet size for an even distribution throughout the powder mass.

*Pump*
The binding solution required for granulation may be pumped into the mixing bowl using a mechanical or peristaltic pump to deliver the binder liquid to the spray nozzle. Special pumps are available for the dosing of high viscosity binders.

*Pressure pot*
Alternatively a pressure pot offers fast, high-pressure delivery of the binder solution, for excellent dispersion of liquid via the binder nozzle spray system. These systems are chosen typically for small scale, R&D-sized granulators.

**Discharging**

*Through-the-wall mill*
Product can be discharged from the high shear granulator directly into a receiving container, or via a sizing mill. This breaks down the granules to produce more even sizing for subsequent processing. The sizing mill may be supplied as a detachable unit for use with more than one process, or fixed-in-place for maximum product containment. The fixed sizing mill is also available as a through-the-wall construction, so that the drive motor and controls are kept away from the clean process area.

**Filtration**

*Material filter & shroud*
Production filtration is achieved using a easily removable material filter that can be cleaned and re-used or alternatively for vacuum and CIP applications stainless steel or polypropylene may be utilised.
Blade Development

**Standard PMA impeller**
Standard blade for use with the conical bowl of the PMA high shear granulator.

**U-Shaped chopper**
Standard chopper for use with the conical bowl of the PMA high shear granulator.

**M8 impeller**
Innovative swept-back design for improved mixing characteristics, faster processing and a more clearly defined end-point. Supplied as standard with the GP™ System, and available as an option for the PMA machine.

**Multi-bladed chopper**
Flush mounted, multi-blade design improves binder solution dispersion and product movement at slow speeds. Supplied as standard with the GP™ System, and available as an option for the PMA machine.

CIP® and WIP
All the high shear granulation systems can be supplied with a wide range of washing-in-place and fully automated cleaning-in-place options. CIP features include combined vacuum cover seal which prevents product leaks, inspection windows in the impeller hub, automated spray head and filter cleaning, and internal O-ring seals.

(*CIP patent)

Cover seal

Process filter

Pelletization

Aeromatic-Fielder’s pelletization technology gives manufacturers precise control over granule growth and layering, for applications such as prolonged release profile products and matrix formulae. The Pellet Processor™ is a dedicated pellet product facility, offering both melt and wet pelletization techniques. For integrated production of a range of products in a single machine, a wet pelletization module is available for the GP System.

**Wet pelletization impeller**
Designed to achieve maximum movement of particles, for efficient pelletization.

**Wet pelletization**
This process uses a Niro Rotary Atomiser spray to achieve excellent dispersion of binder liquid through the mix, and a special high-speed rotation blade for maximum movement of the product, for more efficient pelletization.

A PTFE container-lining minimises the need for ‘top and tailing’, even with the most cohesive of products. Studies have shown that the PTFE liner - unique to Aeromatic-Fielder - can increase production efficiency by as much as 40%.

**Melt pelletization impeller**
Designed to impart maximum movement and energy to the active ingredients, for faster melting of the binder, and pelletization.

**Melt pelletization**
This is an exceptionally fast method of producing pellets in a single step. The active material and binder are mixed in binder form then heated until the binder melts. A single batch is processed typically in just 15-20 minutes, and needs no further drying.

Granulation comparison

**Insoluble active**

Granulation graph showing the improvements gained in a straight walled vessel (GP) when using the new M8 impeller, include reduction in binder solution, reduced granulation time and enhanced end-point definition.
Flexibility in system design

One-pot processing
Aeromatic-Fielder’s GP™ System is the ultimate in versatility. It offers options for blending, high shear granulating, vacuum and microwave-assisted vacuum drying, and melt or wet pelletizing - all carried out in a single container, for maximum efficiency in product processing and handling.

User-selected standard process modules are combined with advanced automation and CIP systems, to create a custom solution to meet individual needs. Should those needs change over time, systems can simply be upgraded - protecting investment and keeping process options open for the future.

Proven technology
The PHARMA MATRIX™ (PMA) high speed mixer/granulator is known all over the world as the industry’s most popular and most reliable high shear granulation technology. A wide range of options for product loading, discharge, process control and cleaning allow users to tailor equipment to process needs.

Quality and innovation
All the Aeromatic-Fielder high shear granulator designs are bottom-driven, and are supplied with purged and pressurised drive seals as standard, for optimum product containment and ease of cleaning. All systems can be designed and installed using the company’s innovative through-the-wall construction, separating drive machinery and control electronics from the process area.

Integrated systems
High shear granulation equipment can be integrated with other up- and down-stream process plant, such as fluid bed systems from Aeromatic-Fielder’s own leading range of dryers, coaters and pelletizers, or wet and dry milling facilities, handling systems and binder preparation units.

GP™ System - one-pot modular design

MG Mixer / Granulator
This basic module forms the heart of every GP™ high shear granulation system. Its straight-walled stainless steel process bowl is designed for easy inspection and cleaning. The MG module comes complete with all equipment for dry mixing / blending and high shear granulation; high intensity M8 mixing blade, multibladed chopper, liquid dispersion system and user-selected control and cleaning systems. The base and side walls of the processing bowl are jacketed for efficient process temperature control.

AV Vacuum Dryer
Aeromatic-Fielder’s innovative AEROVAC™ dryer uses gas assistance to improve heat and mass transfer from the heated bowl. The gas passes up through the impeller drive shaft, and is distributed via removable stainless steel tubes located under each impeller blade. The result is a significant improvement in drying time, compared to traditional indirect vacuum drying techniques.

SP Microwave Vacuum Dryer
The microwave assisted vacuum dryer offers faster, more controlled drying, using a magnetron array in the circumference of the bowl. It is ideal for high-throughput production, where optimization of process efficiency is paramount, and processes which use solvents and/or require a high degree of containment. It is also a good alternative for products which are more heat sensitive, since it does not require the process walls to be heated.

Technical data

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<th>Size</th>
<th>Bowl Volume</th>
<th>Average batch weight*</th>
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<tbody>
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<td>PMA/GP 1</td>
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<tr>
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<tr>
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</tr>
</tbody>
</table>

Values are process and product specific and may vary from those shown above

* Average batch weight at 0.6gm/cm³
Central Know-How on a Global Scale
Based on a strong commitment to research and development, pharmaceutical technology centres in Belgium, Denmark, Switzerland, the UK, Singapore, and USA provide global technical support and know-how to the pharmaceutical industry. These centres of excellence give customers access to a range of test facilities and expert teams with technical and process know-how. Our teams work closely with our customers to optimise processes and evaluate their products, enabling them to achieve their process and production goals.

Contracting Profitable Experience
A world leader in supplying pharmaceutical equipment, Niro Pharma Systems offers manufacturers all over the world the opportunity to enter into a profitable partnership for development and contract. NPS combine advanced in-house technology with a thorough understanding of the pharmaceutical industry to help customers maximize their development results.

Niro Pharma Systems
Niro Pharma Systems is world leader in providing advanced processing solutions for solid dosage forms to the pharmaceutical industry. Based on a dedication to research and durable quality, Niro Pharma Systems offers a wide range of solutions, from individual pieces of equipment to complete integrated plants, by uniting the state-of-the-art technologies of Aeromatic, Buck, Collette, Courtoy, Fielder, Nica and Niro.

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