

FLUID BED PROCESSORS: FOR BETTER AND 'WURSTER'

FRONTIDA BIOPHARM, INC.

JIM MCANDREW
VICE PRESIDENT,
AURORA OPERATIONS

**AUGUST 13,
2020**

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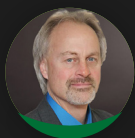
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SECTION 01

ABSTRACT

Frontida's Center of Excellence, based in AURORA, IL is a best-in-class operation for Fluid Bed Technology and manufacturing. With over 25 years' experience in branded drug R&D and production, as well as contract development and manufacturing, we asked **Jim McAndrew** to offer some key insights into how Frontida provides expanded capabilities using Wurster coating processes.

WRITTEN BY:



JIM MCANDREW
VICE PRESIDENT,
AURORA OPERATIONS

SECTION 02

SETTING THE STANDARD

The fluid bed processors equipped with Wurster coating located at Frontida's Aurora, IL site originated from what once proudly stood as a Fluid Air™ assembly and engineering site and Fluid Air's PharmPro CMO operation. Following Frontida's acquisition of this facility near Chicago, the operation retained its original patented equipment and patented processes, along with its industry leading personnel, who have spent decades working in the field and optimizing world-class processes for Fluid Air equipment.



SECTION 03

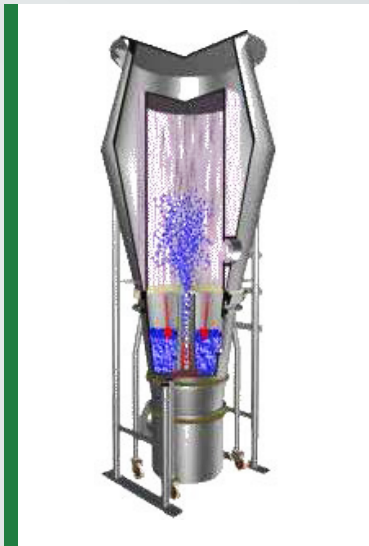
WHAT EXACTLY IS WURSTER COATING?

Wurster coating fluid beds are completely customizable systems that produce superior applications of high quality, reproducible films onto particulate materials such as powders, beads, mini-tablets, crystals, and granulations. This industry leading equipment ensures precise, incremental layering that minimizes the potential risk of agglomeration between particles and has the ability to tackle complex drug release challenges. Wurster coaters atomize these coating solutions or suspended particle flows and reduce air velocity and distribution. This process allows each individual particle to circulate fully throughout a state-of-the-art coating chamber without the risk of destruction; resulting in superior performance every time.

SECTION 04

PATENT HIGHLIGHTS

The control systems installed on Frontida's Wurster coating fluid beds are flexible in their ability to handle a variety of aqueous and solvent coatings and managing critical process parameters while increasing batch sizes. They also possess data collection capabilities unique to Frontida BioPharm, Inc that allow us to utilize the equipment to its full potential. The original inventors of 5 technology patents and processes issued to Fluid Air continue to work for Frontida, resulting in a high level of quality and know-how in Wurster coating and fluid bed manufacturing.



This in-house expertise was utilized from the ground up in developing Frontida's Aurora site for the purpose of adapting many types of process conditions to specific and varied product specifications. Unlike other multipurpose pharmaceutical facilities that install standard fluid beds designed only to fulfill general needs for 2-3 products with respect to equipment loading, lift size, air handling conditions, and liquid application, Frontida's equipment was designed with expanded engineering capabilities that can incorporate extreme conditions with precise tolerances.

SECTION 05

CONCLUSION

There are some important examples of the expanded engineering capabilities offered at Frontida. Since our Wurster coater process blower is scaled to nearly 60% larger than any other of its size, our fluid beds have the ability to lift much denser materials than typical fluid beds, allowing larger batch sizes that result in significant economies of scale. Additionally, Frontida's Wurster equipment can handle significantly higher inlet temperatures and significantly lower dewpoint temperatures beyond standard designs, providing quality reassurance that even exotic processes can be handled at the site. All of Frontida's development and commercial equipment is highly automated and our fluid beds collect 110 different data points every 10 seconds of processing time. This information is then available for both engineering and development teams, providing dynamic insights that optimize the drug development process.

SECTION 05

CONCLUSION (Cont'd)

These capabilities have provided Frontida the opportunity to be a leader in developing and commercializing extended release mini-tablets, drug-layered beads/resins, and granules, including those with multiple release and API populations. When you work with Frontida, you can trust that this same team of experts is available to work on your product-specific technical challenges, employing the best that our equipment and trained personnel can offer.



SECTION 06

ABOUT FRONTIDA

Frontida BioPharm, Inc. is a US-based, minority-owned leading provider of drug delivery technologies, product development, and manufacturing services for pharmaceutical and consumer health companies. Frontida is dedicated to helping our clients and partners reach the market as quickly and efficiently as possible. We support pharmaceutical companies in the development, scale-up and commercial manufacturing of immediate and controlled-release oral solid dose, powder and liquid products; ensuring robust product performance and on-time supply of clinical trial materials and commercial products. Our 325,000+ sq. ft. manufacturing facilities located in Philadelphia, PA and Aurora, IL offer a comprehensive suite of solutions for the development and commercialization of prescriptions, OTC, Highly Potent Active Ingredient (HPAI) products, Phase I through Phase III clinical trial materials, Fixed-dose Combination Products and DEA schedule II–V products. Frontida is equipped with multiple world-class commercial packaging lines, capable of validated product serialization, and providing packaging services for both commercial products and clinical trial material supplies in bottles and blisters. Frontida has an annual capacity to manufacture up to 3 billion tablets and capsules. Our highly experienced industry-leading team of professionals offers a number of available technologies and solutions that facilitate the commercialization of high-quality products.

CONTACT INFORMATION

FRONTIDA

WEBSITE

FRONTIDA.COM

FRONTIDA BUSINESS DEVELOPMENT

+1 (215) 807-1350

EMAIL

FOR MORE INFORMATION, PLEASE
CONTACT FRONTIDA BELOW.

OFFICE LOCATIONS

PHILADELPHIA, PA

FRONTIDA BIOPHARM, INC.
1100 ORTHODOX STREET
PHILADELPHIA, PA 19124

PHONE NUMBER

+1 (215) 288-6500

AURORA, IL

2500 MOLITOR ROAD
AURORA, IL 60502

PHONE NUMBER

+1 (630) 888-3820

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