



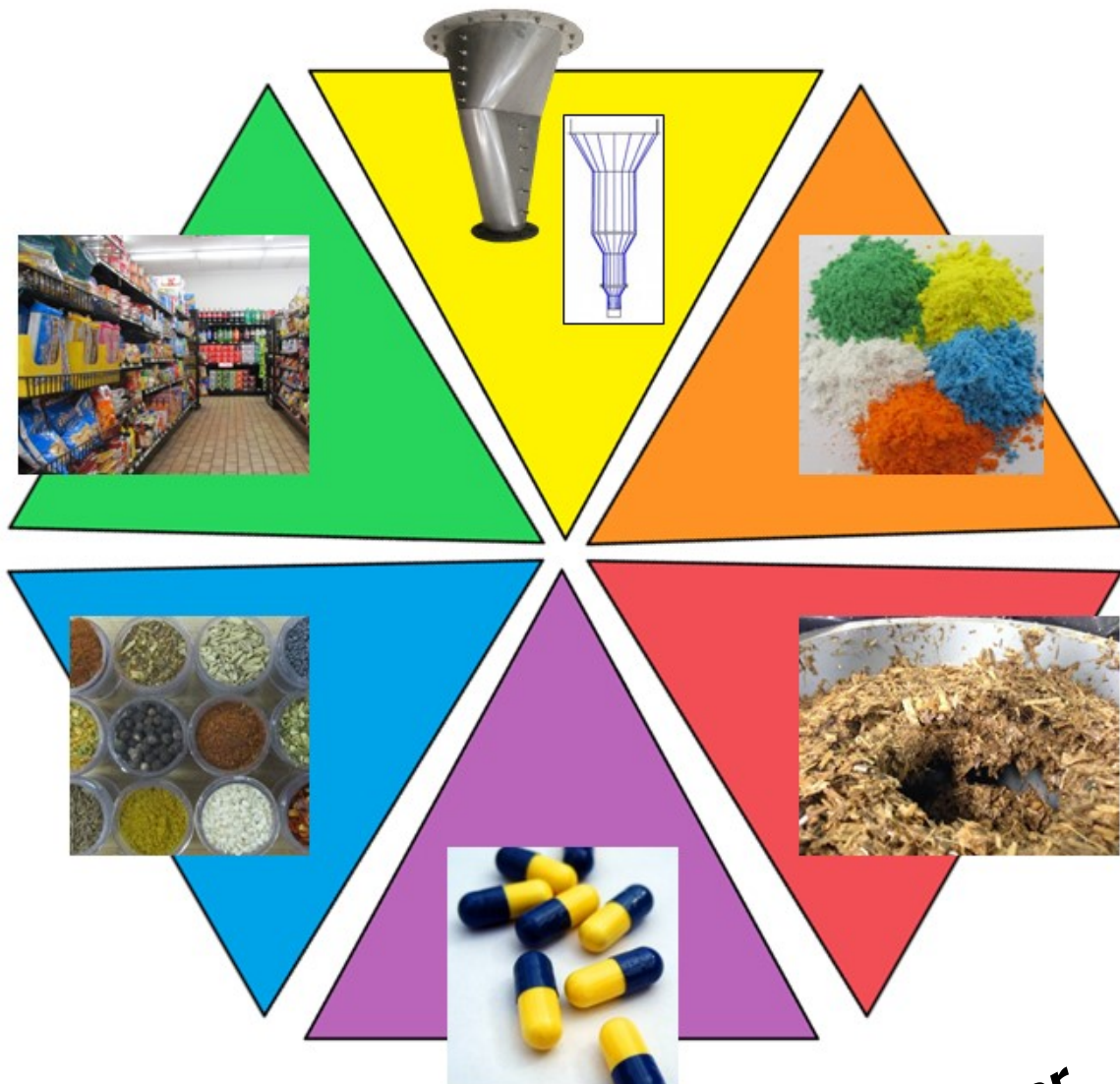
# ***Material Flow Solutions***

***[www.matflowsol.com](http://www.matflowsol.com)***

***+1 325-379-8879***

***5921 N County Road 225  
Gainesville, FL 32609 USA***

# We Believe in ...



- Pharmaceutical / Nutraceutical
- Chemical and cosmetic
- Energy / ash & biomass
- Consumer products
- Foods
- Customized system design

**Serving the Powder  
Handling Community**

## Satisfied Customers

# Engineered Solutions to meet your production goals



## Segregation Solutions

Is the lack of consistent product quality causing a loss of revenue? We measure the flow properties of your bulk solid mixtures and review your proposed or existing process to make cost-effective recommendations to minimize issues of segregation. We have reduced off-spec material production from 50% down to less than 1%.

## Flow Rate Enhancement

Does your process suffer from limited flow rates or uncontrolled material surges? We will offer design recommendations to modify your handling system so as to increase or control process flow rates. We can increase process flow rates by a factor of 100 and bring surging under control.



## Hang-Up Elimination

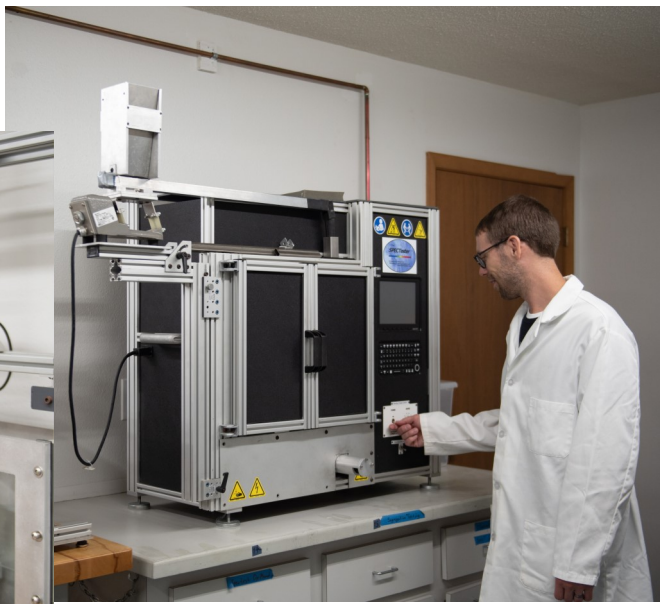
Does your material produce down times caused by plugging and hang-ups? We can measure the flow properties of your material at simulated process conditions and provide you with recommendations to eliminate hang-ups. We have modified handling systems to virtually eliminate hang-ups and allow you to operate your system without manual interventions.

# Our Full-Service Particle Characterization Lab

We offer a full range of material property testing for powders and granulates at simulated process conditions including:

- Flowability: unconfined yield strength, wall friction angle, adhesion, angle of repose, density (bulk, envelope, true), and permeability measurement
- Wear testing
- Moisture sorption analysis
- Thermal conductivity / heat capacity measurement
- Segregation and blending analyses
- Attrition and size degradation
- Dissolution
- Circularity and granularity analysis
- Zeta potential
- Particle size and shape analysis,
- Particle toxicology studies
- XRD ... and more

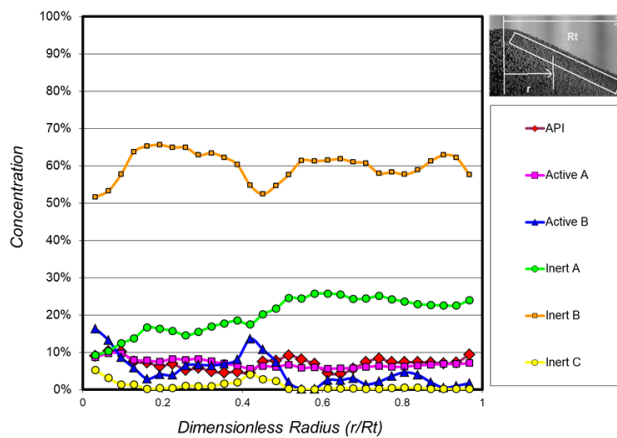
If you have a particle ...  
we can characterize it



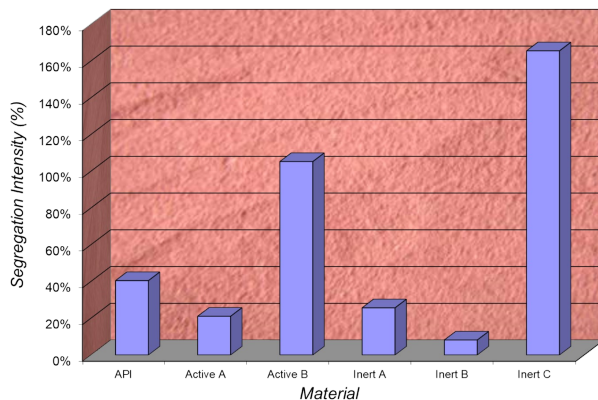
# Product Design Assistance

## Case Study: a heart-healthy drug

A major manufacturer of heart-healthy drug was experiencing off-spec end product and, therefore, unable to meet shipment deadlines. This was very detrimental to the company bottom line. After measuring the segregation potential, particle size distribution and bulk density of both the mixture and the individual components, it was determined: (1) Segregation (primarily sifting) was occurring, (2) The ingredients principally responsible for the segregation were identified, and (3) How those ingredients' interaction with other components in the mixture affected the overall product.



With this information, our lead engineer was able to determine that altering the particle size of one specific key ingredient in the blend, combined with implementing a small change in operational procedure for the process fill operation, would eliminate the segregation problem.



Initial 37% product loss due to waste reduced to less than 5%.



The result: the heart-healthy drug is on pharmacy shelves worldwide

# Process Design Assistance

Whether retrofitting an existing system or designing a new process, our engineers can assist you in creating the optimal design to eliminate flow issues such as: erratic flow, arching and hang-ups, ratholing, segregation, and particle breakage.

We will help you “get it right the first time”



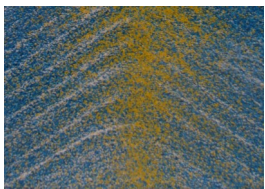
# Seminars (Onsite or Virtual)

We have prepared a set of seminar topics specifically for your process and product engineers to help them design material handling systems, design better products, and successfully select unit operations compatible with critical material properties. This proven approach allows engineers to optimize plant performance and make your operation more productive. We offer both one-day and two-day custom onsite or virtual seminars with topics chosen from any of the following subjects:



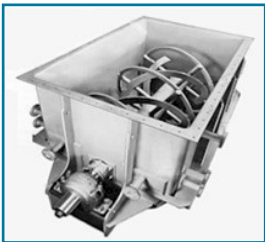
## Successful Plant Design

We can help you design plants to prevent costly down-times from material hang-ups. We discuss both new and retrofit design of powder process plants and identify critical properties that need to be determined to develop optimal plant designs.



## Segregation Prevention

Many of today's industrial products are multiple-component mixtures which must remain mixed until they reach customer plants. We provide you with information needed to maintain mixture integrity during processing and handling.



## Successful Blender Selection

With dozens of blenders in the marketplace and exaggerated vendor claims, it is often difficult to determine the optimal blender for your given process. We provide guidance relating critical material properties to blender performance.



## Particle Size Reduction - Attrition

Particle size degradation occurs during handling and processing. This seminar topic looks at typical problem zones in plants and presents methods for preventing this unwanted behavior.

**These seminars can be tailored to**





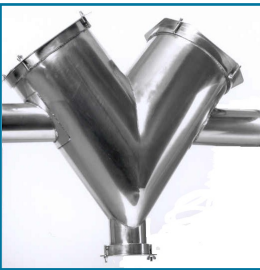
## Successful Product Design

Often engineers have the task of developing a product that must operate using existing plant equipment while providing specified characteristics for customers. We focus on the relationship between material properties and product design.



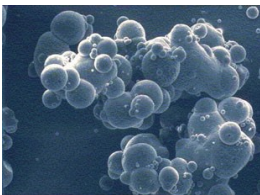
## Bin and Hopper Design

Too often handling system design is completed as an after-thought. Since many problems experienced by processing plants originate in storage and surge bins, we will address their successful design to avoid hang-ups, segregation, and erratic flow.



## Optimal Product Blending

Today's products perform multiple tasks. Often the question arises of how to design the mixture to best achieve the required results. How much blending is needed to produce the optimal product? What is the order of the blending operation? We have answers.



## Agglomeration Processes Selection

Increasing product size is often advantageous. This seminar topic explores methods for both achieving this goal and determining the best method for a given material.



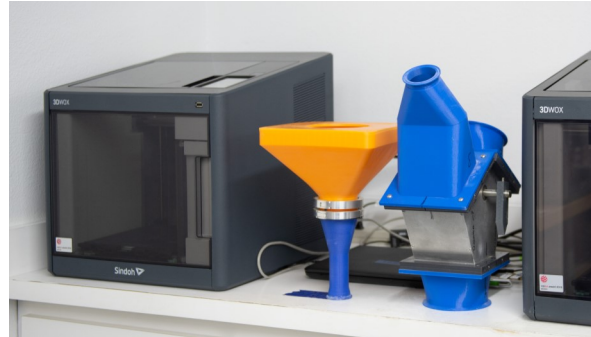
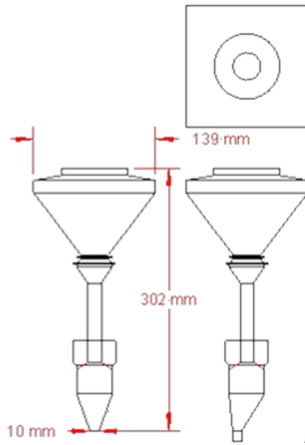
## Feeder Design and Selection

Hundreds of feeders are available from vendors willing to sell their latest novelty. Fundamental, scientifically sound approaches to feeder design and selection significantly decrease feeder problems experienced in industrial plants.

**meet your plant's specific needs**

# On the Cutting Edge

Innovation is the Name of the Game



*Using 3D printing technology to construct bench-scale models of working pharma processes—Since 2014*

**No flow**



**Flow**

*The Diamondback solution to flow issues—Since 2001*

# Novel Tester Development

With decades of experience in the powder and particle industry, we recognized the need for advancement in two very specific areas.

- Segregation potential measurement and prediction of REAL mixtures: not simple bimodal mixtures, but mixtures of multiple components.
- Powder Flowability measurement at product formulation time, at contact pressures low enough to correlate with REAL tablet/capsule fill systems, and in sample quantities small enough to be affordable when high-cost preliminary production quantities are all that is available.



We met the need by developing the SPECTester<sup>®</sup> segregation quantifier and the SSSpinTester<sup>®</sup>

Using the spectral reflectance value of the unique ingredients, as well as the whole mixture, the SPECTester<sup>®</sup> quantifies the segregation potential of a 6-component material. In under 30 minutes, the machine reports how much as well as why your material is segregating. Fully automated, it provides data about: component concentrations, particle size differences, product uniformity, and up to 4 specific segregation mechanisms.

Using the science of centrifugal force, the SSSpinTester<sup>®</sup> measures the unconfined yield strength and density of fine powders using a sample as small as 0.05 gram. New technology extends the testing range down to 0.2 KPA compaction pressure, which allows direct measurement for arching potential – eliminating the need to rely on inherently inaccurate extrapolation for answers.

**Sold through our Sister Company:  
Material Flow Equipment**



# Meet the Team

## Dr. Kerry Johanson—Chief Operations Officer



Dr. Kerry Johanson began his career in powder flow and material handling as a lab technician with Jenike & Johanson during his high school and undergraduate years. After receiving his BS in 1985, he spent 14 years with JR Johanson, Inc. in San Luis Obispo California, finally serving as Chief Technical Officer. He received his Ph.D. in chemical engineering from Brigham Young University in 1994.

Since 2000 he divides his time researching at the University of Florida and serving as the Chief Operations Officer for Material Flow Solutions, Inc. He has authored 40+ technical papers which have been published in technical journals internationally. Dr. Johanson has presented numerous seminars on the topic of powder flow in industrial applications.

Married for 42 years, he is the father of six children, and a grandfather to eighteen. He holds the rank of Eagle Scout with the BSA, and continues to serve his community. Dr. Johanson holds PE licenses in both Florida and Utah and is an active member of AAPS, AIChE, ASME, ASTM, and IChemE.

## Michael Brecht—Senior Laboratory Manager



Michael attended the University of Florida where he graduated with his BS in 2009 and an MS in 2012, both in the field of Agricultural and Biological Engineering. He joined the Material Flow Solutions team in 2013 and currently serves as the Senior Laboratory Manager. His particular areas of interest are: the strength of bulk materials dependent on particle size, degradation of particles as it occurs in a mixture during processing, and the effect of moisture content on caking of bulk materials.

Michael is a member of ASABE and holds the rank of Eagle Scout with the BSA. He is certified as an EIT in the state of Florida, working toward his professional engineering licensure. Married for 10 years, he is the father of one son.

## Bradley Simpson—Machine Shop Supervisor



Retired after 20 years of service as a US Navy machinist, Brad returned to Iraq in support of US troops as a civilian contractor doing what he loves best—machining—for several additional years. Upon returning to the US, he worked in the machine shop with Innovative Machine for some years until he joined the Material Flow Solutions team in early 2012. His experience and expertise keep instrumentation in our testing labs always in good repair and test-ready.

He is the father of three children and ten grandchildren.