

Cost - Effective Flow Parameters for Powders and Bulk Solids

Powder and bulk solids manufacturers have always had an inherent problem. Once product is developed, it needs to be moved. Whether it is through a hopper or feeder system or merely transporting the material, the product needs to be moved. This sounds easy enough, but it can be very complex.

This is where third party bulk solids handling and engineering companies come in. They specialize in developing hoppers and feeder systems to move the material. Customers send them samples of material and they will develop equipment around this sample. But, how to do this? Some methods are primitive, but easy and inexpensive, such as using small flow cups to measure the discharge of loosely consolidated powder through the opening in the bottom of the funnel. Others merely look at the material by visual inspection or give an educated estimate based on past experience. Regardless of method, the information is used empirically to assign design parameters on how the material will flow. This leads to specific choices like what hopper half-angle needs to be used with what finish on the hopper wall.

These methods give an indication, but not the whole picture. Powders and bulk solids need to be defined for flow function, storage, bulk density, wall friction, and other parameters such as arching dimension. All of these factors, and others, play an important role in how bulk solids will flow and an important role in hopper and feeder design.

Plus, what if the material changes? What if there are new formulations? How will heat and humidity affect the material? What about incoming raw materials? How can this be QA checked, verified and characterized? Too often, the end user is left scratching their head while production, literally, is gummed up. Then, a brute force method is usually employed, such as a sledgehammer, or perhaps expensive vibratory or pneumatic systems (or both!) are engineered to get the material moving again. This is costly all the way around, from production downtime to re-engineering existing systems.

The key is to prevent this from happening at the beginning, and not at the end of the cycle. A well designed system, based on known flow parameters for the materials, would prevent most if not all of this from happening. There are instruments that can predict flow characteristics, such as bulk density, wall friction, rat holing and arching dimension. But, there is a cost. Isn't there always? Powder test systems can cost upwards of \$50,000 to \$70,000 and can be complex and difficult to operate. This represents a large investment in time and money, one that companies can be reluctant to make. After all, a sledgehammer is much lower cost. But, there were no alternatives to these higher priced systems.

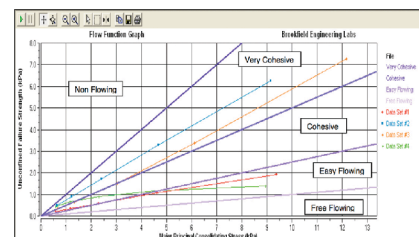
Until now.



Brookfield
Powder Flow Tester

In late 2009, Brookfield Engineering introduced its Powder Flow Tester to the market. Priced at 1/3 to 1/4 of the cost of comparable powder flow test systems, Brookfield's PFT has made powder flow testing affordable and easy.

Backed by Brookfield's 77 years in the instrumentation business and six years of development with the Wolfson Centre at the University of Greenwich in England, the Powder Flow Tester is quick, easy, and cost effective in giving information on powder flow parameters. Using intuitive software, the PFT can give data on powders and bulk solids covering flow function, bulk density, friction angle, arching and rat hole dimensions. All of these parameters can be acquired in one 35 minute test. Additional testing gives wall friction and hopper half-angle calculations. Long term tests can be run to define time consolidation of the material.



Flow Function Test

The Brookfield PFT can be used by anyone with very little training involved. Small samples of 263cc or 43cc (using a Small Volume Shear Cell) are all the sample volume that is necessary for a concise test to be run. The tests do not need to be looked over, either. The user merely measures the sample

for its weight, calls up the correct test type such as Flow Function, starts the test and then walks away to do other chores in the lab or on the production floor. Data is collected automatically.



Brookfield trough with powder sample and shear lid

In order to provide critical information on material behavior for design of powder handling systems, the Brookfield Powder Flow Tester is crucial. Detailed reports and graphs can be generated for the customer on the flow behavior of each powder. This provides the necessary support data to justify choices for individual items of equipment design, such as hoppers, chutes, and feeders.

End users have found value in the Powder Flow Tester to verify their own formulations, characterization, checking incoming products from other vendors, and for outgoing quality checks. Quick checks can be done to ensure that powders will flow properly before there is a problem resulting in costly shut downs. No sledgehammers needed. Why implement a vibratory system if it is proven the problem really exists due to the formulation or a bad batch of material from a vendor? The problem, or problems, need to be defined first before action is taken. Brookfield's Powder Flow Tester can easily accomplish this at great savings to the customer.