SSSpinTester
Low-Volume, Bulk-Strength Analyzer
The fully automated SSSpinTester uses the science of centrifugal force to measure the unconfined yield strength of fine powders requiring a very small amount of sample. The instrument provides repeatable and consistent data by first consolidating the material using centrifugal force to compress the sample inside the sample holder. After the initial compaction step, the SSSpinTester then completes the analysis routine using the same centrifugal force to determine the yield strength of the material. Using the latest advancements in technology, this instrument provides measurements at an extended pressure range. This provides actual performance results without the need to extrapolate data leading to inaccurate results.

Features

- Fast analysis
- Small amount of sample required – 0.5 cc
- One test acquires full data set – multiple measurements not required
- Extended pressure range – 0.05 kPa to 72 kPa
- Fully automated control with software application – provides graphical data reports
- Direct measurement eliminates the need for extrapolation of data
- Small footprint requires minimal bench-top space
- Bonus testing cell, micro-spatula for easy fill, demonstration video, and one-year limited warranty on parts and labor are standard
- Certified CE compliant

Powder Strength and Density Values with Significant Benefits

- Small amount of sample needed for analysis
- Low consolidation (also known as compaction) pressures – Low-pressure strength can be applied to segregation on piles, capsule filling, fluidization, tablet feed, dispersion models, and other low-pressure unit operations or formulation needs. Also runs at the more traditional high-consolidation pressures
- Fast results: a single data point in as little as 3 minutes, a 5-point flow function in as little as 15 minutes
Simple Operation and Testing Procedure

The program initializes with a helpful “progress” bar. It generally takes from 4 to 6 seconds to fully activate.

First Screen

The User may choose to create a new file (begin a new test run) or open an existing file (access previously run test data).

What would you like to do?

Create New File  Open Existing File

Enter Test Condition Information:

<table>
<thead>
<tr>
<th>Material ID</th>
<th>Limestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content</td>
<td>1</td>
</tr>
<tr>
<td>Temperature (°F)</td>
<td>72</td>
</tr>
<tr>
<td>Storage Time (sec)</td>
<td>20</td>
</tr>
</tbody>
</table>

Create File and Begin Test with entered Condition  Select Condition from Existing Data Set

Filled Test Condition

Enter information to define the material to be tested and some testing conditions. "Storage Time" represents the length of time the material will be subjected to the chosen consolidation pressure in the test cell before failure. Twenty seconds represent the material strength as it moves through the system (instantaneous strength). Longer times (up to 60 seconds) represent the strength the material may gather as it is stored in a system.

Addition of Pressure Tables

Define [enter] a series of desired consolidation or compaction pressures. Press “Add Point(s)” and the table in the lower left of the screen populates. Next, select a pressure from the table and click “Run Test”.

Analysis

User-friendly prompt screens lead the technician through the 6-step test procedure.
After each strength measurement is taken, a point appears on the program screen graph representing the material strength at the specified consolidation pressure. The time requirement to acquire this FULL flow function is approximately 90 minutes. A 25-point flow function on any other strength testing apparatus will take from 8 hours to a week.

The curved line on the graph of the consolidation (compaction) pressure vs. the bulk material strength represents flow function. This report can be either downloaded in an Excel-ready format or created as a PDF.

Strength Report

Density report for BCR limestone represents a full 16-point flow function report of density vs. major principal stress (consolidation pressure).
### Typical SSSpinTester Applications

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powdered metals</td>
<td>An optimal powder is one that has enough cohesion to prevent segregation, but not enough to cause density variations. Obtaining strength values at low consolidation pressures allows prediction of optimal powdered metal behavior. The SSSpinTester can measure the strength of heavy metal powder at actual fill pressure values for direct correlation to processing conditions.</td>
</tr>
<tr>
<td>Additives (for energy)</td>
<td>Additives are typically introduced to coal combustion streams through pneumatic conveying. The strength of the powder often determines how it flows through the system. Measuring the strength of these powders at low to moderate compaction pressures can help with conveying this material.</td>
</tr>
<tr>
<td>Ceramics</td>
<td>Density variations of sintered ceramic powder can cause significant problems with dimensional tolerances of the final parts. Filling pressures are very low and the density variations depend on the strength of the material. Segregation can be prevented by the cohesive properties of the bulk. The SSSpinTester can help avoid an off-spec product by measuring the strength of the ceramic powder at actual fill pressure values for direct correlation to processing conditions.</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>Strength testing during formulation of pharmaceutical API powders is possible when only a very small quantity of the material is available. Tablet presses, for example, fill die cavities at very low pressures and then are compacted to very high pressures. The weight variance from tablet to tablet is directly related to how the die fills. The filling depends on the strength of the material at low pressures. The SSSpinTester can provide data at actual pressures.</td>
</tr>
<tr>
<td>Food (fine powders only)</td>
<td>Food engineers need a quick test to measure the cohesion properties (strength and density) to determine if a particular mix will cause flow problems in the unit operation being used at the food plant. The SSSpinTester offers a fast and accurate measure of material strength at a full range of consolidation pressures.</td>
</tr>
<tr>
<td>Chemical</td>
<td>Often an engineer wants a quick test to measure the cohesion properties (strength and density) of a particular formulation. Chemical mixtures may also be experiencing segregation and/or density variations in the process. The optimal powder is one that has enough cohesion to prevent segregation, but not enough to cause density variations. The SSSpinTester offers a fast and accurate test to measure cohesion properties that allows quick verification of the chemical formulation’s behavior in the existing or proposed system.</td>
</tr>
<tr>
<td>Catalysts</td>
<td>Measuring the strength of catalyst material at low consolidation pressures can allow the scientist to determine if a catalyst will channel and correlate this information to the life of the catalyst in a fluid bed. The SSSpinTester measures the cohesiveness (strength and density) of the catalyst powder at actual process operating conditions, thereby avoiding messy manual extrapolation which is inherently inaccurate and time-consuming.</td>
</tr>
<tr>
<td>Cosmetics</td>
<td>Decisions can be made regarding the size and shape of the powdered ingredients to optimize packaging success. The SSSpinTester can give the formulator and process engineer the data at actual pressures that are needed for successful packaging. Until now, they have had to test at much higher pressures and then extrapolate the data to real-time processes.</td>
</tr>
</tbody>
</table>
Specifications

Physical
- Length: 18 in.
- Width: 16 in.
- Height: 15 in. (includes the feet)
- Mass: ~22.5 Kg or ~50#

Electrical
- Voltage: 85 – 264 VAC
- Frequency: 50/60 Hz
- Single Phase 9A

Environment
- Temperature: 0 to 50 °C (32 to 122 °F)
- With RH maximum of 78%

For additional product and materials analysis service details visit:
www.particulatesystems.com