

GRANUDRUM™

THE NEW POWDER RHEOMETER
DYNAMIC ANGLE OF REPOSE AND COHESIVE INDEX MEASUREMENTS



DESCRIPTION

GranuDrum instrument is an automated powder flowability measurement method based on the rotating drum principle. A horizontal cylinder with transparent sidewalls called drum is half filled with the sample of powder. The drum rotates around its axis at an angular velocity ranging from 2 rpm to 70 rpm. A CCD camera takes many snapshots for each angular velocity. Then, for each rotating speed, the flowing angle (also known in the literature as 'dynamic angle of repose') is computed from the average interface position and the dynamic cohesive index is measured from the interface fluctuations. A low value of the flowing angle corresponds to a good flowability.

PRINCIPLE

The flowing angle is influenced by a wide set of parameters: the friction between the grains, the shape of the grains, the cohesive forces (Van der Waals, electrostatic and capillary forces) between the grains. The dynamic cohesive index is only related to the cohesive forces between the grains. A cohesive powder leads to an intermitted flow while a non-cohesive powder leads to a regular flow. Therefore, a dynamic cohesive index closes to zero corresponds to a non-cohesive powder. When the powder cohesiveness increases, the cohesive index increases accordingly. Therefore, the Cohesive Index can also quantify powders spreadability.

KEY BENEFITS

- › Measurement is simple, fast and intuitive, easy to interpret.
- › The filling and cleaning of the cell is simple and fast.
- › The cell can be handled in a glove box, a hood or confined enclosure before being safely transferred to the instrument.
- › Delivered with intuitive software, both average and variance are easy to access and allows the comparison of results. All pictures and data are automatically collected and stored for post processing. Easy data transfer and automatic report generation.
- › Recorded standard operating procedures increase the repeatability of measurements.
- › The GranuDrum cell is chemically coated and can handle powder from various dimensions.

DIFFERENTIATORS

- › Dynamical angle of repose at both low and high speeds (1 to 70 RPM, i.e. from 4 to 290mm/s).
- › Easy data interpretation and physical principle.
- › Use of fluctuations to quantify powder cohesive forces.
- › Powders cohesion may vary while handled, this property called "powder thixotropy" becomes accessible with the GranuDrum.
- › High measurements reproducibility (for example with high density materials like Stainless steel = 1.8%, or low-density materials like Excipients = 4.2%).
- › A smart design guarantees high robustness and long lifetime.
- › Cell can be conditioned through a glove box under a specific atmosphere (inert gas, humidity and temperature).

APPLICATIONS

- › Classification of powders flowability for a wide range of applications.
- › Well suited for geometries involving high shear and low pressure like additive manufacturing spreadability and pharmacy pneumatic conveying.
- › Perfect tool to quantify powders spreadability and for speed optimisation (due to its original Cohesive Index analysis) during a recoater process in Additive Manufacturing.
- › Predictions of powders flowing behaviour during a pneumatic conveying process. Detection of problematic samples before introduction inside the process.

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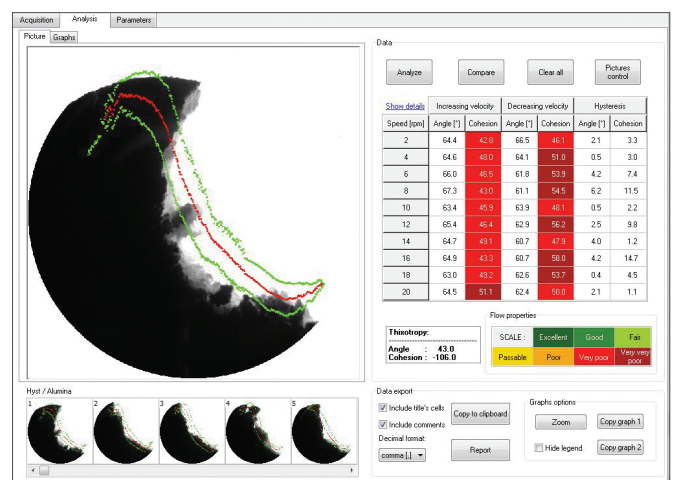
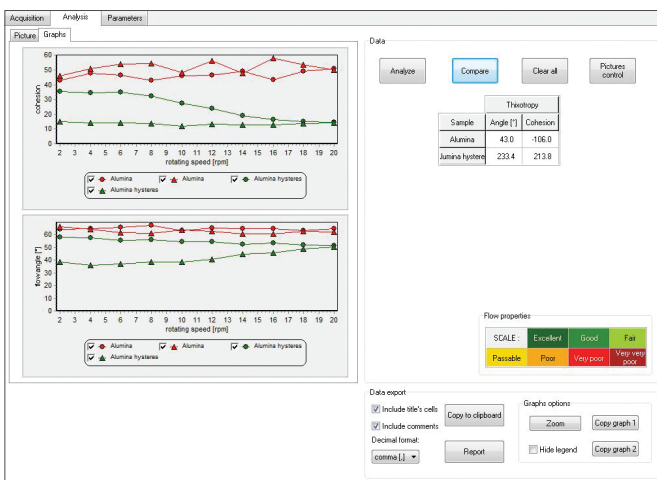
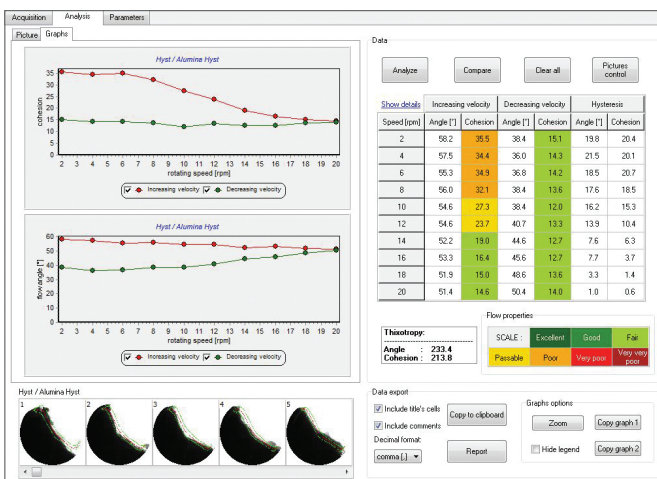


OPTIONS

- › Extra measurement cells, allowing measurements of small powders quantities (10, 20, 30 and 40ml), especially useful for pharmacopeia and precious metals.
- › High temperature cell that can be used up to 200°C.
- › Calibration kit.
- › Standalone software license, one computer run measurements, while another one analyses the data for time optimisation.

GRANUDRUM SPECIFICATIONS

DIMENSIONS LxWxH (mm)	560x360x420
WEIGHT (kg)	15
ROTATION VELOCITY	1 (4mm/s) to 70 rpm (290mm/s)
SAMPLE VOLUME (ml)	10 to 50ml
CAMERA	USB 2.0. Monochrome CMOS Camera
LIGHT SOURCE	LED Screen background lightning
FRAME INTERVAL	500ms to 2s
FRAME RESOLUTION	800 x 800 pixels
COMPUTER REQUIREMENTS	Dual core with 2.0GHz, 4Go RAM, Windows XP to 10 with up to date Service Packs
CONNEXION	USB 2.0 port



GRANUTOOLS sprl : Rue Jean-Lambert Defrêne, 107 - 4340 Awans - BELGIUM +32 483 19 83 39
contact@granutools.com | VAT num. : 0642.967.072 | IBAN : BE67 7320 3748 4487

WWW.GRANUTOOLS.COM

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