VS100

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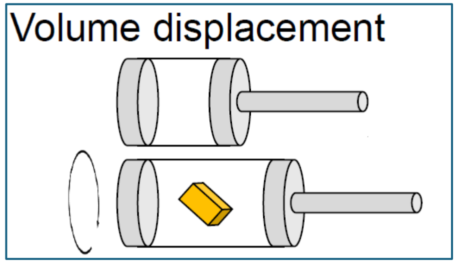
Volume scanner **VS100** for fast, accurate and repeatable measurement of ribbon solid fraction and porosity within the roller compaction / dry granulation process for PAT (Process Analytical Technology) and IPC (In-Process Control)

Motivation:

Determining a solid fraction requires measuring both mass and volume.

While the mass of a sample can be determined easily, quickly, and without destroying the sample using a lab balance, measuring its volume presents a more difficult problem.

A displacement method using a powder with a defined particle size distribution has become established in pharmaceutical production. The sample to be measured is embedded in the powder and the resulting volume change is measured.



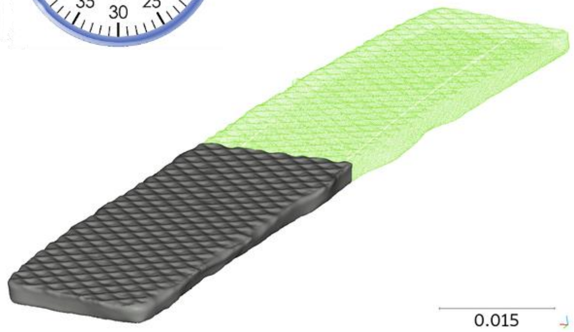
However, this process requires complex and therefore time-consuming and error-prone sample handling, especially with highly potent active ingredients. Furthermore, the sample to be measured is contaminated and lost for repeat measurements.

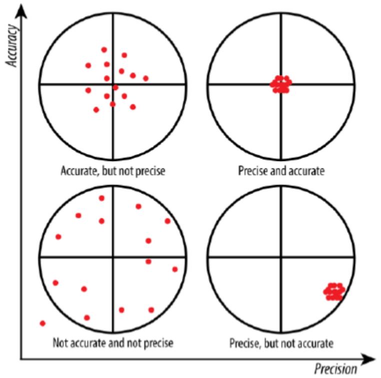
Rapid process analysis for controlling ongoing production is therefore not possible.

Solution:

Optical measurement of the sample volume to allow

- fast determination of the sample volume (within 1-2 minutes)
- 3D data is available for visual verification and documentation
- maintenance-free operation without consumption of consumables
- for mass determination before and after volume measurement to detect loss of material and to avoid measurement errors
- repeated measurements to allow determination of accuracy and precision
- for fast estimation of the porosity
- for using the measurement in IPC and PAT





Background:

The development was initiated by Boehringer-Ingelheim around 10 years ago.

Several years of internal testing and optimization of the VS100 followed.

To establish the process, Boehringer-Ingelheim funded a postgraduate position at the University of Bonn with the goal of comparing the optical volume measurement with the VS100 with the more established displacement measurement method and the reference method of µCT.

This work was completed by Tim Lillotte and was presented at the International Journal of Pharmaceutics in 2021, Volume 610, 15 December 2021, 121241.

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Laser triangulation as a fast and reliable method for determining ribbon solid fraction; focus on accuracy, precision, and measurement time

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Findings of this work:

The achievable accuracy is comparable to the well-known displacement method.

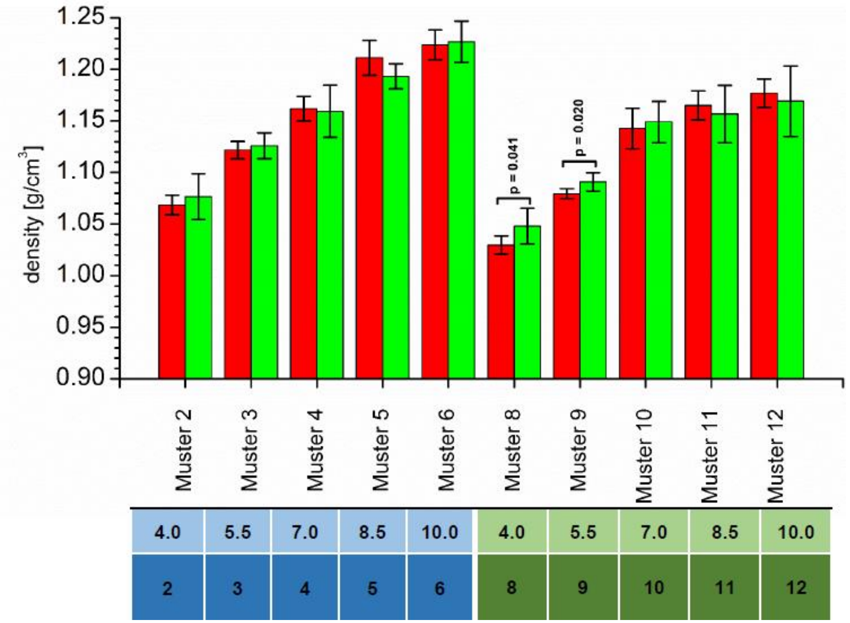
The measurement error rate is significantly lower when using the VS100.

The VS100 is significantly easier to handle (even when wearing protective equipment).

The possible measurement time is many times faster when using the VS100 than compared to displacement measurements or even µCT.

Measurements using the VS100 allow multiple measure-ments to generate statistics and assess measurement capability.

Samples with increasing solid fraction measured with µCT as reference method (red) and VS100 (green).



Further facts and benefits:

- The VS100 is now in use at different places worldwide for development as well as in production sites.
- The VS100 is ready to be used in automated laboratories. SiLA2 is to be implemented soon.
- Direct balance interface, HMI highly customizable
- Integration in the internal process data acquisition can be accomplished by OPC-UA, SQL and customized interfaces.
- VS100 performance is tested on a regular base by requesting a calibrated steel part.
- With the knowledge of the true density the porosity of the ribbon material can be derived from the solid fraction.
- Since the first VS100 was built over 10 years ago, there has never been a failure of a VS100 volume scanner, nor any necessary repair.

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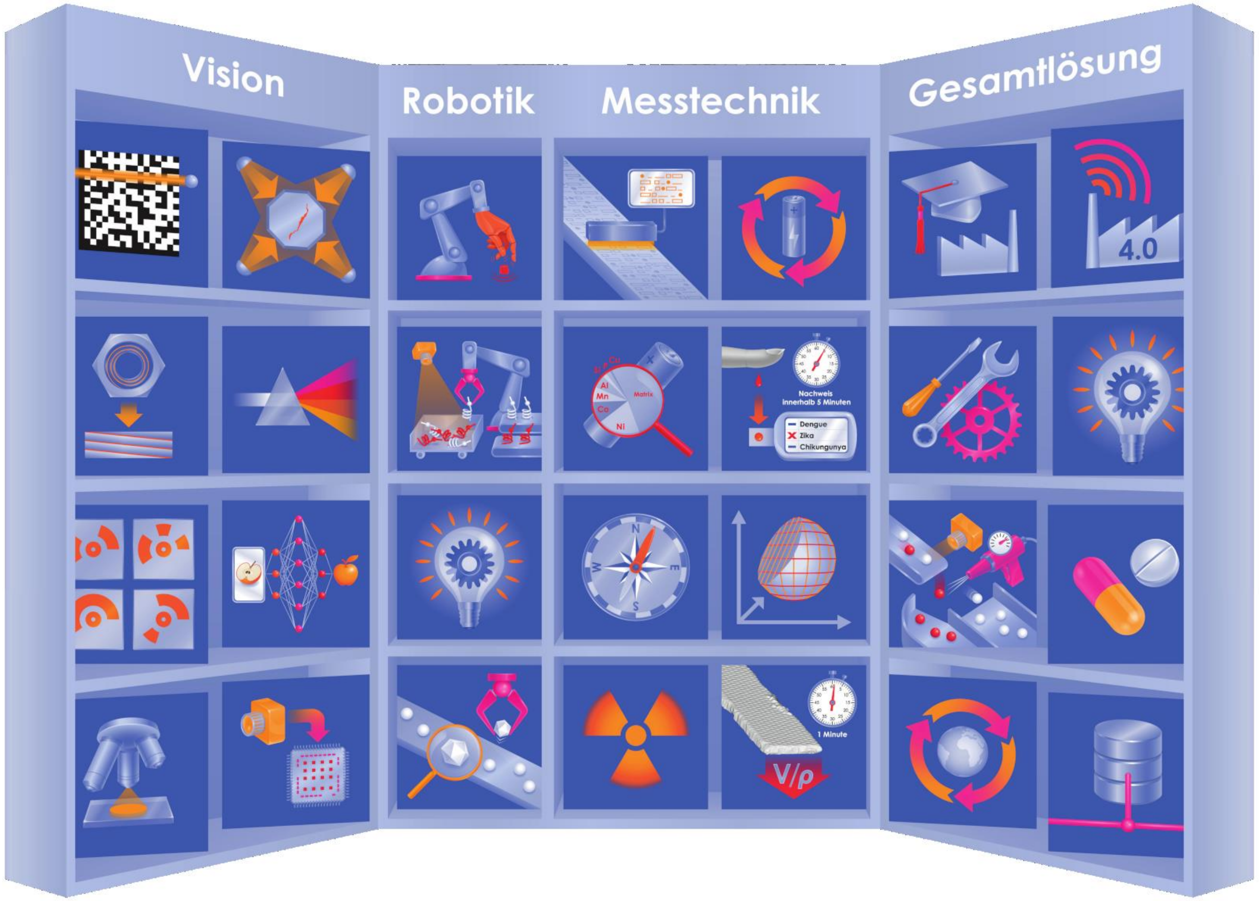

You can find us and the VS100 at the POWTECH TECHNOPHARM

hall 10.0 / booth 10-248f

Thank you!