



Physico-chemical characterization of powder blends

Characterizing the ribbons to optimize production performance.

Optimizing continuous granulation by ribbon compaction

Granulation is a process in which particles of powder are made to adhere to one another to form larger multiparticulate entities.

This intermediate stage is fundamental in pharmaceutical production, with effects including easier handling than with the initial powder and better blend homogeneity.

Various processes are used. Dry granulation is a process suitable for continuous production which consumes less energy and resources than wet granulation. However, this process requires the definition of critical parameters → INDATECH is proposing a new analytical tool to meet this need.

How to quickly optimize your granule production

To allow inspection of the compaction and milling process, the physical and chemical features of the blend must be characterized.

The combination of digital imaging and infrared spectroscopy integrated in a hyperspectral imager enables you to collect and process information from the whole electromagnetic spectrum for each pixel in the image acquired.

The combination of spectral and spatial information will enable at-line characterization of intermediate products which have undergone a compaction or milling phase. In this way, the quantitative effects of the compaction force, applied to a blend of powders, or the proportion of the API (Active Pharmaceutical Ingredient) in this blend will indicate the progress of the process.



IC-PIR solution: HypeReal

CA INDATECH proposes a unique inspection solution capable of testing a wide variety of solid samples by means of no-contact measurements from beneath the sample.

HypeReal's technology is the ideal tool for quick, non-destructive analyses of powders in the laboratory.

This spectroscopic equipment can be used to:

- Characterize powder blends
- Identify the active pharmaceutical ingredients and the excipients
- Detect contamination
- Assess the level of compaction/granulation of a ribbon, which is an intermediate product.

Characterizing compacts and granules (compaction force and API concentration):

The compactness of the compacts was analyzed with HypeReal and the hyperspectral images were then analyzed using chemometrics.

Figure 1 shows the scores from the Principal Component Analysis and the mean spectra of the compacts subjected to different compaction forces. Particularly between 1400 and 1650 nm, levels of intensity can be seen which seem to be dependent on the compaction force. The predictive model of the compaction force confirms this trend.

The PLS (Partial Least Squares) quantitative model of the compaction force enables good prediction of this physical parameter across a wide range.

The same type of modeling can also be used to establish a prediction for a chemical parameter. API quantification inside a granule powder blend, as shown in Figure 2, enables you to obtain a good model for quantifying the percentage of the API. In this way, it is possible to view the powder concentration directly in false colors on the image, facilitating interpretation by the operator.

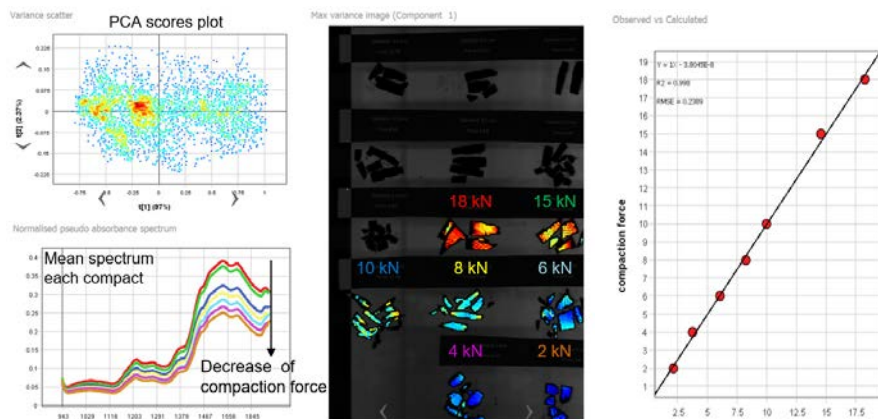


Figure 1:
Principal component analysis and predictive model for measurement of the compacts

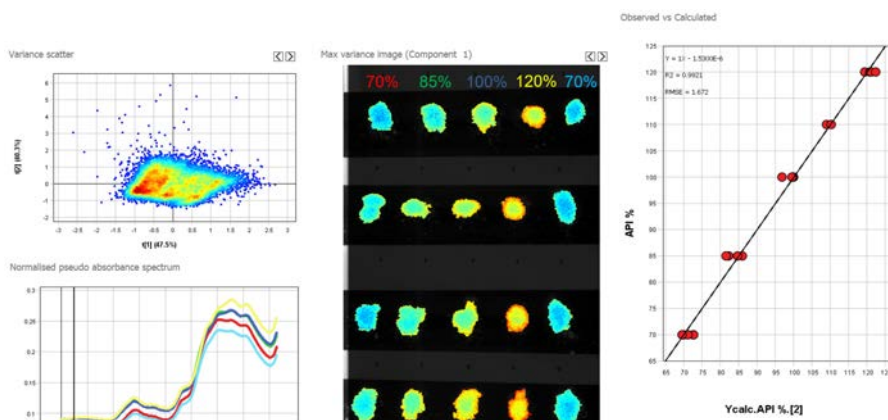
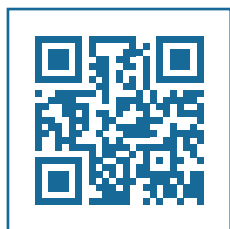


Figure 2:
Principal component analysis and predictive model for the quantity of API



INDATECH's teams will
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your question
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Advantages of HypeReal

- Elimination of problems related to the flatness or shadows of the products to be inspected
- Flexible configuration for ribbons, powders or granules thanks to a specific optical assembly
- Highly robust, repeatable measurements
- Quick, accurate inspection of blends by non-specialist staff
- Provision of dedicated trays for the samples with reference integration
- Integration of the Breeze software for a single tool handling data acquisition, analysis and reports
- Increased knowledge or understanding of the compaction/granulation process
- Evaluation of the compaction force applied to a compact

