



Sieves to Laser Diffraction... HOURS TO SECONDS. See what you've been missing!



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Why spend hours performing Particle Size analysis on your dry powders using sieves when you can spend seconds with the Beckman Coulter LS13 320? Tired of the noise, dust, and hours of process time required measuring your samples and analyzing data? The LS13320 employs a 3 step process that features low noise, no dust, small material requirement, and virtually no sample preparation! Additionally, the Beckman Coulter LS13320 has the capability of correlating to existing and empirical data to minimize the transition curve from sieving to automated Laser Diffraction method. This application note will detail the basic differences between the two methods.

Introduction

This application note will provide a detailed explanation of the LS13 320 using the Tornado Dry Powder System to demonstrate to the customer how to easily and confidently transition from their current dry powder sieving method to an automated method utilizing LS13 320 instrument which enables them to reduce processing time, improve accuracy, and reproducibility, which in the end will translate into better overall Quality Control process.

Background

[1] Sieving (gradation) has been the traditional method for dry particle size analysis that dates back centuries in civil engineering as it is critical component to determine how materials performs in use. A sieve analysis can be performed on any type of non-organic or organic granular materials including sands, crushed rock, clays, granite, feldspars, coal, soils, a wide range of manufactured powders, grain and seeds. In today's dry powder particle size analysis world the sieving method is still prevalent. The drawbacks can be many; i.e. environmental factors (noise, dust, and vibration), labor intensive sample and equipment preparation, (sieve preparation and cleaning, and manual data processing), operator to operator variability, size resolution (only 4-6 data points), accuracy and precision, random bias from the particle shape which translates into poor R & R, in essence, the accuracy of the measurement integrity. The LS 13320 Laser diffraction method offers the following advantages: reduced environmental impact (low noise, no dust, and no vibration), minimal instrument setup, virtually no sample preparation, and the measurements require only seconds to run! Further, the total amount of sample required for the LS13 320 is generally much less than for the sieving method. For example, when measuring medium ground coffee the total volume of 35cc (Figure 2) weighs approximately 10 grams, versus the 100 grams typically required for the sieves (Figure 1), which provides a ratio of 10:1 less material required for the Laser Diffraction method. Results can be presented with a direct correlation from the customer's historical sieving data to the Beckman Coulter LS13 320 Laser diffraction result.



Figure 1 - Sieve Pans - Minimum sample amount is typically 100 grams



Figure 2 - LS13320 sample vials - Sample amount is typically 35cc

Future state

Below are the minimum steps required for the customer to confidently transition from sieving to Laser diffraction. After the instrument has been configured with the SOP (Standard Operating Process) that is custom designed specifically for a particular product, the steps are simply:

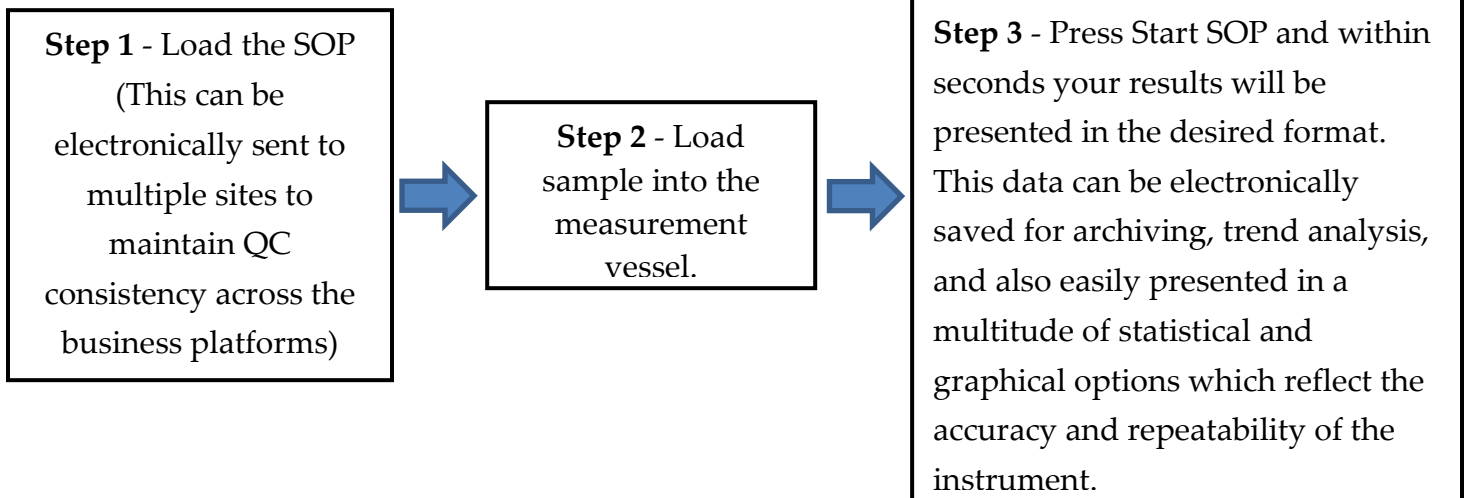


Figure 4 – LS 13 320 with Tornado Module

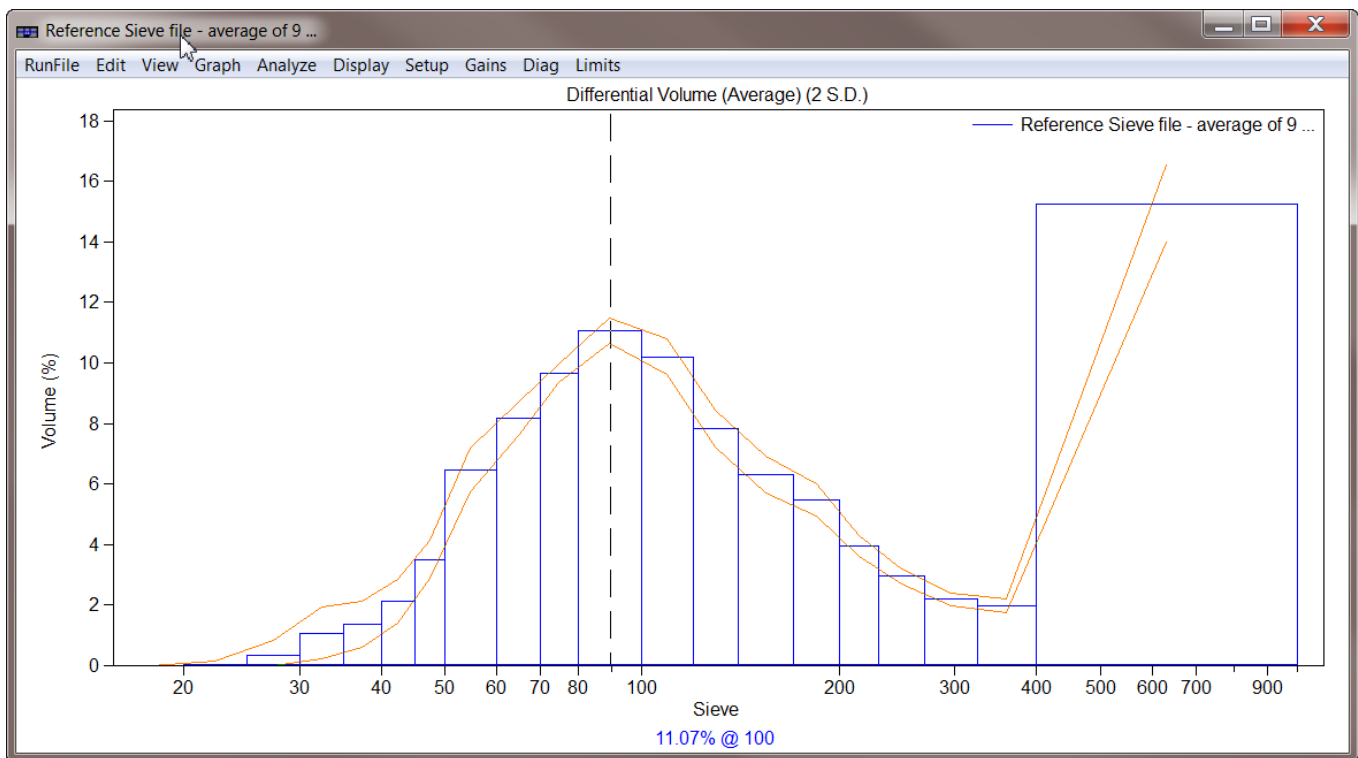


Figure 5 – Correlation Graph LS 13 320 to historical Sieve data

Conclusion

Equipped with a few pieces of historical data from a sieving process (number and mesh size of the sieves and the typical differential volume percentages) the LS13 320 can accurately measure and correlate your sieve data (Figure 5) while providing nearly a 100 more measurement points. This application note has demonstrated a practical method for simple and accurate correlation from a manual sieving process to an automated method using the Beckman Coulter LS13 320 Laser Diffraction system. The advantages are: low environmental impact, increased accuracy, reliability, and reproducibility. The time savings alone would be reasonable justification for transitioning to this modern method, but the fact that no special training or skills are required the operator can enjoy the ease and freedom of a single push button measurement. Contact the Beckman Coulter Life Science sales team today to request a demo.

References

1. p231 in "Characterisation of bulk solids" by Donald McGlinchey, CRC Press, 2005

About the author

Bill F. Bars is an Application Engineer / Scientist for Beckman Coulter Life Sciences in Grants Pass, Oregon, USA. He has created and developed many of the liquid systems production processes and procedural tools for the BEC Particle Counting products. He has worked for Beckman Coulter Life Sciences for 18 years in a multitude of engineering capacities ranging from Metrology to Service Training and Application Support. Email him at: bbars@beckman.com

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