

A Brief History of Air Jet Sieving for Particle Size Analysis of Powder

The name Hosokawa has been synonymous with powder and particle processing innovation for more than a century, pioneering techniques and equipment to meet the evolving needs of chemical manufacturers, academia and research establishments. Jack Owens, from Hosokawa Micron Ltd, takes a look at the history of pneumatic dry sieving technology for particle size analysis.

Determining particle size distribution is an important technique for chemists who create or handle powders and is essential for quality control. Commercially, it is used by industries including chemicals, pharmaceuticals, cosmetics, food, agrochemicals and minerals – who use it to help manage the efficient, consistent production of products and powder-based ingredients. For academic and scientific purposes, particle size analysis comes into its own for R&D, testing and materials control.

There are lots of other ways to analyse powder – from laser diffraction and image analysis, to x-ray sedimentation – and many ways to characterise particles through sieving, including horizontal, tapping, sonic, wet and throw action. Air jet sieving offers the most accurate method of determining particle size.

Air jet sieving utilises directional blown air to create an efficient sieving action and automatically captures the weight of oversized particles which cannot pass through the sieve. The sieve mesh size is incrementally reduced in size for each pass until a full set of particle size distribution data is obtained. Air is forced upwards through the base of the sieve via a rotating nozzle, and suction on the underside of the sieve ensures that all particles, which are small enough, will pass through the sieve into a collection vessel, ready for the next pass. The engineered airflow also breaks up agglomerated material to ensure the most accurate data possible is obtained.

Pneumatic dry sieving using air was invented by Hosokawa back in the 1950s and the first model made was the Air Jet Sieve A200 LS. The ground-breaking technology was devised to mitigate the issues of very fine powders agglomerating while being analysed, which is a common problem. The

desktop instrument was a revelation. Efficient, economical, accurate and reliable, it became popular in laboratories around the world. For quality assurance purposes, the Air Jet Sieve was able to effectively explore reproducibility, as well as replaceability.

Since the first Air Jet Sieve A200 LS was introduced in 1953, there have been several major technology upgrades, but the cosmetic design and basic principle has become an industrial design classic that has changed little over the past seventy years. In fact, the original Air Jet Sieve remained largely unchanged from 1953 until 1994, when an electric control panel was introduced, which made analysis quicker but its footprint less compact.

Fast forward six years and the technology and capabilities developed even further, while the footprint reverted to more or less the compact size of the original (37cms wide), with the (now) touchscreen control panel better integrated and conveniently sighted. Today, the latest version has similar streamlined looks, but the technology at its heart is infinitely more powerful and sophisticated.

Tighter industry standards have led to its software and design being validated to ISPE, GAMP, FDA, ISO, ASTM and ATEX standards, plus the integration of more automatic processes and wider capabilities – such as sieve set management, manually adjustable under pressure, analysis of results against set-point specifications and

parameter management, audit trails, e-signatures, language settings and password management – demonstrate just how far the Air Jet Sieve technology has advanced to meet the needs of its users.

The success of Hosokawa's air jet sieving methodology continues. There are approximately 15,000 Hosokawa Air Jet Sieves in circulation, with components and digital technology to meet the needs of toxic and non-toxic materials that require accurate, reliable micro-precise analysis, batch control, continuous process, raw material control and classification methods. Seventy years on, results are categorised by Hosokawa's, industry-standard, particle size analysis measurements, which are internationally recognised.

Hosokawa Micron Ltd is exhibiting at ChemUK 2021 (stand B12) and will have an Air Jet Sieve 200 LS to view. For further details about air jet sieving, please contact Jack Owens, Sales Engineer, on +44 (0)1928 755293 or email JOWens@hmluk.hosokawa.com

