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Optimizing Paints, Inks, and Coatings: Addressing Particle Size Challenges with Laser Diffraction Analysis

Issues and Challenges

The performance of paints, inks and coatings is strongly influenced by the physical characteristics of suspended particles.

The main challenges for manufacturers include:

1. Formulation stability
- Suspensions must remain homogeneous over time.
- Oversized, or poorly distributed particles, favor sedimentation and flocculation.

2. Covering power and opacity
- Particle-dependent light absorption/scattering properties.
- Accurate size control improves opacity and reduces pigment demand.

3. Surface appearance and finish
- Decorative coatings (gloss, matte, satin) require strict particle size control to ensure visual quality.
- Fine and uniform particles provide smoother and more consistent films.

4. Compatibility with application systems
- Each process (inkjet, spraying, rolling) sets strict particle size limits.
- Excessive particle size can cause nozzle blockage or uneven application.

5. Mechanical and functional properties
- In technical coatings (anti-corrosion, hydrophobic, conductive), filler size and distribution are critical.
- Particle characteristics directly define the final performance of the film.

Contributions of laser diffraction particle size analysis

Laser diffraction particle size analysis is a fast, accurate and reproducible method for measuring the particle size distribution in a liquid or powder formulation.

Key advantages:
- Fast measurement, often in less than one minute.
- Wide measurement range: detects both fine particles (< 0.1 µm) and coarse particles (> 1,000 µm).
- Excellent repeatability thanks to automation and optical precision.
- Real-time quality control: allows for quick adjustments in formulation or production.
- Stability monitoring: tracks changes in particle size distribution over time to predict product stability.

Solution from HORIBA

The Partica LA-960V2 is one of the most advanced devices on the market for laser diffraction particle size analysis. It offers several key advantages for manufacturers of paints, inks and coatings:

1. Wide measurement range (10 nm to 5,000 µm)
- Enables comprehensive analysis in a single measurement, without changing optics or methods.
- Ideal for complex formulations containing multiple particle sizes (e.g., fillers + pigments + additives).

2. Exceptional accuracy and reliability
- High-sensitivity dual detector technology.
- Repeatability of around 0.5%.
- Automatic optical alignment for maximum measurement stability.

3. Ease of use
- Intuitive interface with pre-programmed protocols.
- Easy cleaning and maintenance, reducing downtime.

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4. Advanced dispersion modules

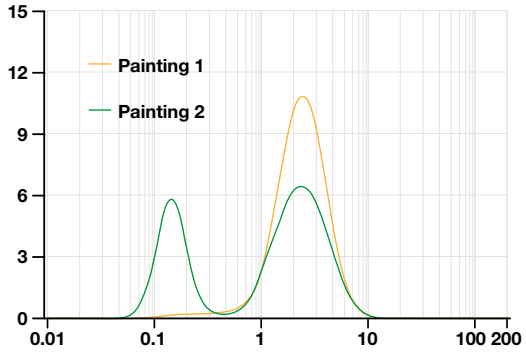
- Efficient liquid dispersion system (adjustable ultrasound, flow control).
- Ability to measure aggregates and granules in their original state, as well as when they are dispersed into isolated particles.

5. Powerful software tools

- Advanced distribution analysis (bimodal, trimodal, etc.).
- Automatic comparison with internal standards or specifications.
- Customizable report generation.

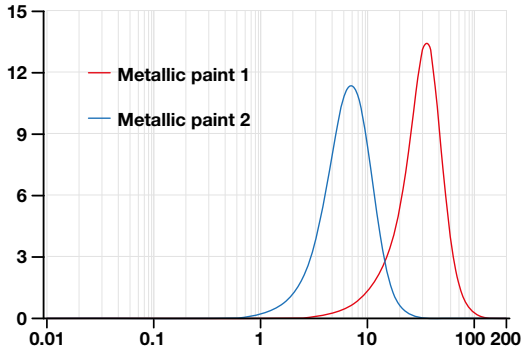
Partica LA-960V2

Example



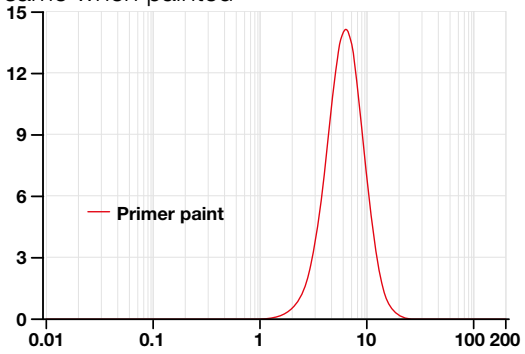
Data name	D(v.0.1)	D(v.0.5)	D(v.0.9)
Painting 1	1.17 µm	2.35 µm	4.35 µm
Painting 2	0.13 µm	1.58 µm	4.06 µm

Normal paint and functional paint containing nanoparticles. Both have similar D90 and look the same when painted



Data name	D(v.0.1)	D(v.0.5)	D(v.0.9)
Metallic Paint 1	14.37 µm	31.05 µm	50.17 µm
Metallic Paint 2	3.14 µm	6.48 µm	11.49 µm

Metallic Paints: With and Without Glitter



The particle size is strictly controlled to improve adhesion while preventing the underlying surface from showing through

Conclusion

In the paint, ink and coating industries, laser diffraction particle size analysis is an essential tool for ensuring product quality, stability and performance. HORIBA's Partica LA-960V2, with its wide measurement range, high level of accuracy, and ease of use, perfectly meets the requirements of these industries in their quest for efficiency, reproducibility and continuous optimization of formulations.

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