



# Precision Color Measurement of Plastic Pellets: A Comparative Instrument Study

Plastic pellets present unique challenges for color measurement due to their variability in shape, size, gloss level, and translucency. Accurate and repeatable data requires an instrument capable of managing these complexities with both optical precision and workflow efficiency.

## Study Overview

In this evaluation, a diverse set of plastic pellet samples was analyzed using three HunterLab benchtop instruments:

- Agera L2
- LabScan XE
- ColorFlex EZ.

All measurements were conducted using the HunterLab 50 mm sample cup (PN# 04-7209-00), filled to the top in accordance with **ASTM D6290** standards. Each pellet sample was measured on each instrument five times, with the contents of the cup re-poured between measurements to simulate real-world sample variability and assess repeatability.



## Sample Variety and Methodology

A wide range of pellet types—differing in gloss, translucency, and pigmentation—was included to represent the spectrum of materials commonly encountered in plastics manufacturing. This approach ensured that the evaluation covered both straightforward and challenging measurement scenarios.



Each sample underwent a total of **five replicate measurements per instrument**, with data collected and analyzed for consistency, precision, and comparative performance.

## Results and Interpretation

The results as seen in the data below demonstrate that **Agera L2** delivers the most precise and consistent measurements across all sample types.

|   |                    | AGERA |        |        | LabScan XL |        |        | ColorFlex EZ |        |        |
|---|--------------------|-------|--------|--------|------------|--------|--------|--------------|--------|--------|
|   |                    | L*    | a*     | b*     | L*         | a*     | b*     | L*           | a*     | b*     |
|  | Average            | 16.01 | 0.37   | 0.35   | 16.84      | 0.38   | 0.56   | 17.29        | 0.44   | 0.41   |
|   | Standard Deviation | 0.15  | 0.01   | 0.07   | 0.30       | 0.05   | 0.12   | 0.31         | 0.06   | 0.08   |
|  | Average            | 44.85 | -10.93 | -24.29 | 44.97      | -10.00 | -24.99 | 45.09        | -10.71 | -24.93 |
|   | Standard Deviation | 0.30  | 0.08   | 0.15   | 0.25       | 0.06   | 0.15   | 0.58         | 0.06   | 0.14   |
|  | Average            | 23.88 | 7.71   | 8.50   | 24.37      | 8.05   | 9.05   | 24.09        | 7.99   | 8.63   |
|   | Standard Deviation | 0.34  | 0.13   | 0.09   | 0.40       | 0.13   | 0.12   | 0.62         | 0.16   | 0.07   |
|  | Average            | 34.06 | 1.65   | 2.51   | 34.44      | 1.70   | 2.71   | 34.87        | 1.21   | 1.36   |
|   | Standard Deviation | 0.48  | 0.00   | 0.06   | 0.42       | 0.01   | 0.05   | 1.30         | 1.25   | 2.44   |
|  | Average            | 53.30 | 1.91   | 8.07   | 53.38      | 1.93   | 8.16   | 53.76        | 2.04   | 7.95   |
|   | Standard Deviation | 0.68  | 0.01   | 0.06   | 0.68       | 0.01   | 0.06   | 0.70         | 0.02   | 0.06   |
|  | Average            | 76.48 | -1.15  | 5.36   | 77.79      | -1.13  | 5.33   | 78.13        | -1.01  | 5.15   |
|   | Standard Deviation | 0.72  | 0.01   | 0.04   | 0.57       | 0.02   | 0.04   | 0.81         | 0.02   | 0.03   |
|  | Average            | 22.22 | -10.76 | 2.34   | 22.27      | -10.78 | 2.13   | 22.02        | -11.12 | 2.24   |
|   | Standard Deviation | 0.26  | 0.13   | 0.04   | 0.25       | 0.12   | 0.04   | 0.42         | 0.16   | 0.07   |
|  | Average            | 36.04 | -1.12  | -2.86  | 36.24      | -1.13  | -2.78  | 36.28        | -1.07  | -2.99  |
|   | Standard Deviation | 0.33  | 0.01   | 0.02   | 0.52       | 0.02   | 0.05   | 0.28         | 0.01   | 0.03   |
|  | Average            | 53.54 | 1.14   | -17.41 | 54.12      | 1.47   | -17.98 | 54.52        | 1.78   | -18.16 |
|   | Standard Deviation | 0.50  | 0.09   | 0.22   | 0.43       | 0.09   | 0.23   | 0.54         | 0.16   | 0.41   |
|  | Average            | 24.39 | 16.59  | -2.47  | 24.82      | 17.47  | 3.21   | 24.65        | 16.98  | 2.47   |
|   | Standard Deviation | 0.50  | 0.16   | 0.07   | 0.46       | 0.16   | 0.05   | 0.51         | 0.20   | 0.10   |

|   |                    |       |       |        |       |       |        |       |       |        |
|---|--------------------|-------|-------|--------|-------|-------|--------|-------|-------|--------|
|  | Average            | 26.48 | 10.39 | -27.21 | 26.72 | 11.00 | -27.00 | 26.69 | 10.91 | -27.95 |
|   | Standard Deviation | 0.43  | 0.10  | 0.29   | 0.50  | 0.09  | 0.23   | 0.49  | 0.13  | 0.28   |
|  | Average            | 32.01 | 41.58 | 16.69  | 32.91 | 42.60 | 18.70  | 32.31 | 42.38 | 17.07  |
|   | Standard Deviation | 0.47  | 0.32  | 0.13   | 0.39  | 0.35  | 0.16   | 0.79  | 0.29  | 0.03   |
|  | Average            | 82.68 | -3.06 | 2.60   | 83.21 | -3.01 | 2.50   | 83.22 | -2.90 | 2.39   |
|   | Standard Deviation | 0.22  | 0.03  | 0.02   | 0.17  | 0.03  | 0.03   | 0.23  | 0.02  | 0.02   |
|  | Average            | 54.11 | 0.05  | -0.33  | 54.24 | 0.24  | -0.26  | 55.47 | 0.32  | -0.53  |
|   | Standard Deviation | 0.52  | 0.04  | 0.24   | 0.89  | 0.03  | 0.36   | 0.55  | 0.04  | 0.43   |
|  | Average            | 77.62 | -1.85 | 3.43   | 79.70 | -1.75 | 3.36   | 79.78 | -1.69 | 3.23   |
|   | Standard Deviation | 0.24  | 0.02  | 0.12   | 0.21  | 0.01  | 0.12   | 0.26  | 0.02  | 0.12   |
|  | Average            | 85.96 | -2.36 | 5.27   | 86.78 | -1.99 | 5.69   | 86.91 | -1.97 | 5.85   |
|   | Standard Deviation | 0.21  | 0.03  | 0.10   | 0.19  | 0.02  | 0.10   | 0.17  | 0.04  | 0.12   |
|  | Average            | 64.98 | -4.82 | 30.08  | 67.06 | -4.64 | 31.51  | 67.29 | -4.62 | 30.94  |
|   | Standard Deviation | 0.30  | 0.04  | 0.09   | 0.34  | 0.04  | 0.01   | 0.50  | 0.11  | 0.13   |



This superior performance can be attributed to several key design and technology advantages:

- **LED-Based Calibrated D65 Illumination:** Agera L2's light source delivers exceptional spectral stability and uniformity, eliminating drift, pulsing, or fading concerns associated with traditional lamp technologies.
- **Larger Optical Area-of-View:** A broader viewed sample area reduces the influence of pellet orientation and sample non-uniformity, improving measurement repeatability.
- **Advanced Optics and Geometry:** The 0°/45° circumferential design provides optimal correlation with visual perception, minimizing directional bias from gloss or texture.
- **UV Control for Fluorescent Samples:** Built-in UV-Included and UV-Excluded modes allow precise evaluation of optically brightened materials with automated comparative reporting.
- **Integrated Gloss Measurement:** For applications where appearance matters, Agera L2 also captures gloss values simultaneously with color, streamlining workflows.
- **Touchscreen Interface and Embedded Software:** Agera L2 features an industrial-grade touchscreen with fully integrated EasyMatch Essentials software, eliminating the need for a separate PC—unlike the LabScan XE and ColorFlex EZ.

*Read on below as we explore these features in more detail!*



## Agera L2 Advantage: Delivering Superior Results in Plastic Pellet Measurement

While this technical comparison between Agera L2, LabScan XE, and ColorFlex EZ clearly demonstrates Agera's superior precision in measuring plastic pellets, the real value lies in *why* Agera outperforms these legacy systems—and how that translates to better quality control, fewer errors, and greater confidence in every measurement.

### Larger Area of View: Measuring What Truly Matters

Plastic pellets are often irregular in shape, size, translucency, and gloss. The Agera L2 features a significantly larger viewed sample area compared to LabScan XE and ColorFlex EZ, allowing it to average across more pellets with each measurement. This minimizes variability from individual pellet inconsistencies and delivers color values that better represent bulk visual appearance.

**The result:** reduced sampling error, tighter tolerances, and more dependable batch-to-batch consistency.

### True Calibrated D65 Daylight and UV Control

Unlike the xenon flash or filtered tungsten technologies used in ColorFlex and LabScan XE, Agera L2 uses solid-state CIE Calibrated LED source illumination that provides unmatched stability and uniformity. This ensures the sample is evenly lit—especially important when measuring translucent or glossy pellets where uneven light distribution can create misleading results. Uniform illumination improves repeatability, especially in re-pours and multi-operator environments.

ColorFlex and LabScan XE approximate D65 with limited accuracy and offer no real UV control. Agera L2 features a fully calibrated D65 daylight simulator *with calibrated UV*, giving you confidence that what you're measuring aligns with how the product will



look in natural light. For optically brightened materials, such as white or translucent plastic pellets, Agera's automated UV-Included and UV-Excluded controls allow you to isolate fluorescence effects—critical for accurate pass/fail decisions and regulatory compliance

## Advanced Optics, Real-Time Imaging, and Integrated Gloss

The Agera L2 utilizes industry-standard  $0^{\circ}/45^{\circ}$  circumferential geometry—widely regarded as the most visually correlated configuration for measuring color the way the human eye sees it. In this setup, the sample is illuminated perpendicularly ( $0^{\circ}$ ), while reflected light is captured from 15 points around a full  $360^{\circ}$  circle at  $45^{\circ}$ . This eliminates directional bias from pellet shape, surface texture, or random orientation—delivering true, repeatable color values that reflect what an observer would see.

Paired with a high-resolution, embedded imaging system, Agera L2 allows users to visually confirm each measurement area in real time. This ensures consistent sample presentation, reduces operator error, and provides traceable image records alongside every reading. For translucent or glossy pellets, this added visibility helps confirm uniform coverage at the port and avoids unintended gaps or stacking effects.

## Streamlined Operation and Built-In Intelligence

Unlike LabScan XE and ColorFlex EZ, which rely on external PCs and legacy software, Agera L2 runs fully onboard with an industrial-grade touchscreen and EasyMatch Essentials software. This integrated system simplifies workflow, reduces maintenance, and supports faster decision-making, especially in high-throughput labs.

## Conclusion:

The Agera L2 isn't just more precise, smarter, faster, and better suited for the challenges of modern pellet measurement. Whether you're working with translucent



resins, optical brighteners, or pigmented compounds, Agera delivers actionable color data with confidence and consistency that older systems can't match.