
The world's true measure of color
HunterLab

MEASURING THE COLOR OF CEMENT AND CONCRETE POWDERS AND SLURRIES

WITH ColorFlex L2

Cement Batch Formulation
(Wet & Dry Mixes

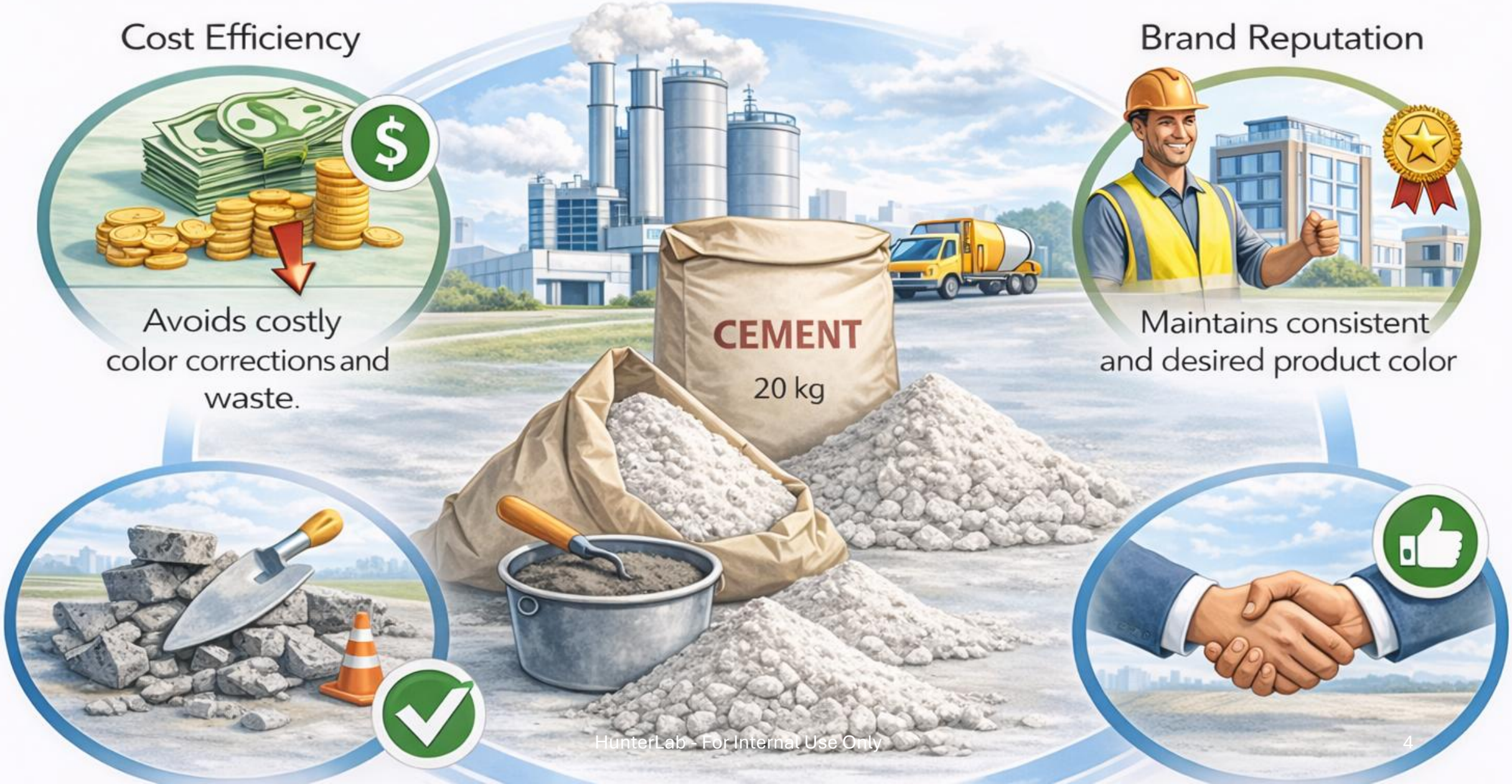
Pigments and Raw
Materials

Concrete Batch Formulation
(Wet & Dry Mixes)

Color Measurement
through Development

Cement Markets
& Applications

Importance of **Color Quality** in Cement Manufacturing



Raw Material Composition

Chemical contents of raw materials influence cement color.

Processing Conditions

Inconsistent color can signal issues in the production process.

Strength & Durability Clues

- Color inconsistencies can signal problems affecting strength.

Consistency & Blending

- Equates to consistent quality control across sites.

Cementitious materials and practical uses

Having the ability to act like cement by forming a solid, durable mass when mixed (often with water).

Cementitious Materials:

- Portland Cement
- Fly Ash
- Slag Cement
- Silica Fume
- Natural Pozzolans

Practical Implications:

- React with water (hydration)
- Bind aggregates together,
- Contribute to strength, durability, and color

- Materials that react with water, harden, and can bind other materials (sand, gravel, etc.) together.

Critical for Cement QC

- Chemical composition impacts

- Variations signal inconsistencies

- Key in initial and long-term appearance

- Key in initial and long-term appearance

Color as a Diagnostic Signal in Cement Production

Raw Material Composition

Chemical contents of raw materials influence base cement color.

Processing Conditions

Color shifts can indicate kiln or process variation.

Strength & Durability

- Color inconsistencies may signal mix or curing issues.

Consistency & Blending

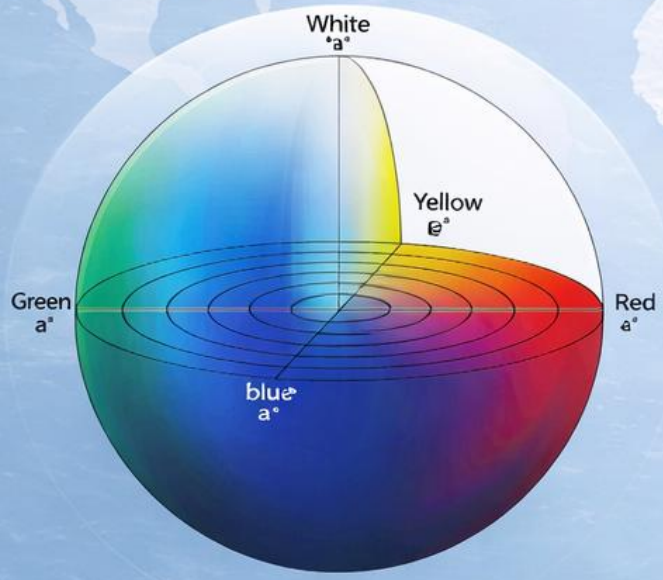
- Uniform color reflects stable

Customer Perception

- End users expect consistent appearance.

Global Standards for **Color Measurement in Cement and Concrete**

International Commission on Illumination
Commission Internationale de l'Éclaiéger
Internationalé BeluttettungsKommisson



L*, a*, b* Color Space

ΔE* Color Difference

ASTM E308
Calculation of Object Color

ASTM D2244
Color Differences and Tolerances

ASTM E1164
Spectrophotometry geometry

Powders

Direct measurement of cement powders

Concrete Products

Color control of architectural concrete

Production QC

Rapid QC measurement

Process Consistency

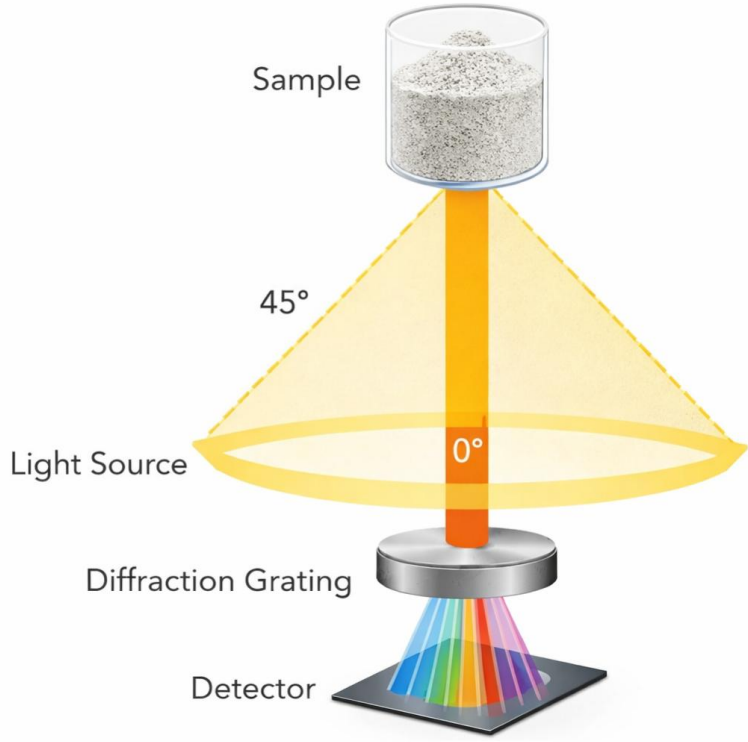
Ensures batch-to-batch colo consistency

ColorFlex L2 provides fast, reliable color measurement for cement powders, pigments, and finished concrete products.


Lab 04-7209-00 45mm
25mm
Color Data Table
Color Plot
Spectral Plot
Spectral Data
Measure
Sample Cup
HunterLab
ColorFlex EZ

Feature | 45°/0° Reflectance Geometry

- The HunterLab ColorFlex L2 uses 45°/0° reflectance geometry
- Visually correlated configuration for measuring color as the human eye perceives it
- 45° illumination | 0° detection
- Ideal setup for powders like cement
- Ideal for evaluating surfaces where both color and appearance define quality



Feature | HunterLab fused-silica sample cup

- Specially engineered for optical clarity
- Precisely sized to fit the ColorFlex L2 port plate
- Ensures consistent and repeatable sample presentation and exact sample to optics distance
- Unaffected by harsh chemicals
- The dimensions, face quality, and flatness of the cups are monitored by HunterLab Quality Assurance
- For critical measurements, these glass cups are recommended, since the sample will be viewed through the glass bottom of the cup

Feature | Built-in High-resolution Embedded Camera for Sample Viewing and Screen Recording

- **2592 × 1944 active-array sensor (5 MP) with a 1/4" optical format and 1.4 µm × 1.4 µm pixel size**, providing crisp, detailed surface images of the sample area.
- **High sensitivity (600 mV/lux-sec) and low-noise OmniBSI™ sensor architecture** ensure clear imaging even on dark or low-reflectance materials.
- **Captures a calibrated image of the exact measurement area**, allowing operators to verify sample placement, detect surface contamination, confirm texture orientation, and document visual appearance alongside numerical color and gloss data.
- **Captured images can be stored, exported, and included in batch records**, audits, or customer reports, providing visual traceability that directly links every measurement to its physical sample.

Feature | Sealed Optics and Enclosure

- **Protects optics from dust and powder contamination,** ensuring consistent measurement accuracy in harsh industrial environments
- **Maintains long-term calibration stability** by isolating sensitive optical components from airborne particles and moisture
- **Reduces maintenance and cleaning requirements**, minimizing downtime and operator intervention
- **Improves measurement reliability for powders, slurries, and granular materials** during testing
- **Extends instrument lifespan** by protecting internal components from environmental exposure in production settings

Feature | Local Action/Read button

- **Dedicated local action read button** for reading samples and executing key functions.
- **Provides a convenient, one-touch operation** that speeds up workflow and minimizes handling errors—especially useful when measuring multiple samples or working with gloves in production environments.
- **Effortless to operate**, ensuring consistent, efficient color measurement across users and locations.

Feature | Modern Touchscreen Color Display

- **Powerful onboard software** that delivers a complete, self-contained environment for measurement, data management, and report generation–all without the need for an external computer.
- **Pre-installed within the instrument**, it enables fast setup, streamlined workflow, and secure local data storage directly from the touchscreen interface.
- **Take precise and reliable color measurements in seconds** and seamlessly analyze multiple tristimulus and spectral data sets.

Feature | EasyMatch® Essentials On-board Software

- **Large Format Visualization:** View measurement data, color plots, and QC results on a larger external monitor for improved clarity and analysis.
- **Enhanced Team Collaboration:** Allows operators, supervisors, and quality teams to review results simultaneously.
- **Improved Decision Making:** Larger displays make it easier to interpret trends, tolerances, and pass/fail results quickly.
- **Flexible Workspace Integration:** Connects easily to external monitors in laboratories, control rooms, or production environments.

Feature | EasyMatch Quality Central

Network-Based Enterprise Color QC Software

For laboratories that prefer a PC-based workflow, the ColorFlex L2 integrates seamlessly with **EasyMatch® Quality Central**, the enhanced desktop version of Essentials.

This advanced platform expands functionality with multi-instrument management, third-party software connectivity, more advanced analysis , and cloud-based data backup and restore, supporting enterprise-wide color control and long-term traceability.

Feature | EasyMatch Quality Central

Benefits for Centralized Customers (Single Site, Small to Mid-Size Operations)

✓ **Centralized Data Management:** All color standards, tolerances, and measurements stored in one secure PC location

✓ **Automatic Backup & Data Redundancy:** Instrument data mirrors to the PC automatically – reducing risk of data loss

✓ **Simplified Reporting & Documentation:** Generate professional reports from a central workstation

✓ **Improved Workflow Visibility:** Quality managers gain oversight without needing to access each instrument individually

✓ **Scalable Growth Path:** Start with a single site and expand seamlessly if operations grow

Result: Structured, secure color QC with improved traceability and operational confidence – without IT burden

Feature | EasyMatch Quality Central

Benefits for Enterprise Customers (Multiple Instruments, Multiple Sites, Global Operations)

✓ **Central Standard Creation:** Create master standards and tolerances at headquarters

✓ **Global Standard Deployment**: Push standards to multiple instruments across sites using Ethernet on a shared network

✓ **Fleet-Wide Synchronization:** Maintain consistency across production lines, plants, or global facilities

✓ **Enterprise-Level Data Control:** Centralized management of instrument data across your entire fleet

✓ **Improved Global Visual Alignment:** Ensure that products made in different locations meet the same color expectations

✓ **Reduced Variation & Rework:** Eliminate local drift in tolerances and methods

✓ **IT-Friendly Architecture:** PC-based system integrates cleanly into enterprise networks

Result:: One source of truth. One quality language. One global standard.

Feature | EasyMatch Solutions

Whether operated as a stand-alone workstation with **EasyMatch® Essentials**, connected to a **Large Format Display ,** or integrated into **EasyMatch® Quality Central**, ColorFlex L2 delivers the same trusted results with less hardware, fewer steps, and complete data traceability.

EasyMatch® Essentials L2

Complete
On-board Control

EasyMatch® Essentials L2

Complete On-board Control
with **Large Format Viewing**

EasyMatch® Quality Central

Network-based centralized
color QC software

Feature | Advanced Data Export and Communication

- **Plug-and-play connection** via Ethernet TCP/IP–no proprietary drivers
- **Automatic data export** to LIMS, SPC, or MES systems
- **Real-time color trending** and remote diagnostics
- **Secure, traceable communication** compliant with GMP and ISO 17025 workflows


HunterLab
Powder Cement
Sample 17
Sample 18
L*
29.96
a*
33.65
b*
28.26
PASS
Measure
HunterLab
colorflex EZ

Schedule a free color consultation
with our experts

www.hunterlab.com