Automatic Closed Loop Color Control ACLCC

For Plastics Manufacturing

Optimize operator efficiency while ensuring consistent color quality throughout a production run with this PLC-based Closed-Loop Color Control system.

The system uses colorimetric data from a in-line color spectrophotometer to control the feeder rate, automatically adjusting material flow to maintain preset color tolerances. It also adjusts for bulk density variations of color concentrates and color variations caused by embossing patterns and can be run in concert with gravimetric systems that control virgin, regrind and other additives.

The system ensures consistent color quality throughout a production run, freeing operators to focus on additional value-added activities while minimizing scrap and product recalls.

Challenges in Plastic Extrusion Manufacturing

Plastics production demands tight tolerances and efficient use of materials. This places a heavy burden on operators and equipment, particularly when it comes to producing color components that must meet exacting standards.

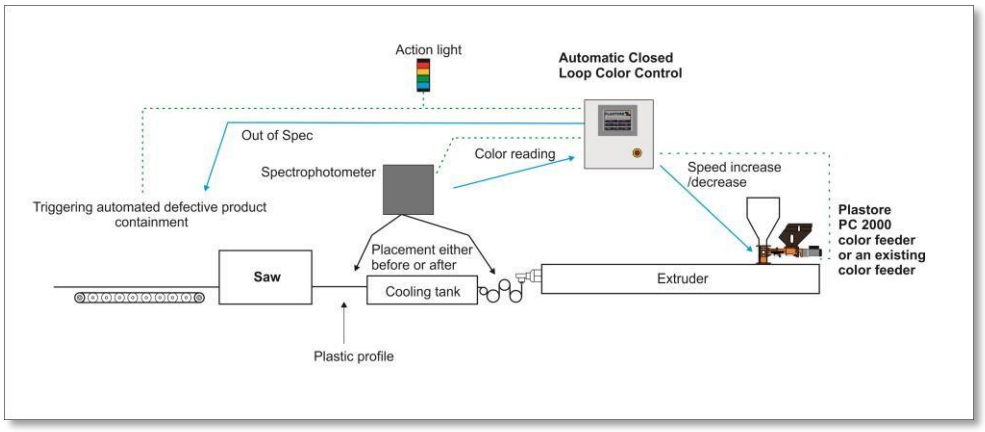
Maintaining a high level of color quality control is a challenge that can often lead to material waste, line shutdown, extensive operator involvement, and product scrap and rework. Often times, variation between operators can impart error in the process leading to unnecessary changes in the production run. Insuring timely QC checks can be challenging and when missed, can result in out of spec color, increased scrap cost, or worse, sending out of spec product to the customer.

The Solution – Automated Closed-Loop Color Control

Plastore, Inc. has developed the solution that optimizes operator efficiency while ensuring consistent color quality throughout a production run: Automated Closed-Loop Color Control (ACLCC). This system takes over much of the hand and eye work associated with production, providing an automated, in-line control system to eliminate color errors and product waste.

The system consists of a high resolution, lab-grade color spectrophotometer designed for in-line color monitoring, and a PLC with closed-loop color control software developed by Plastore, Inc.

The solution uses colorimetric data to control the feeder rate, adjusting material flow automatically to maintain color within preset color tolerances. The PLC allows programming downstream actions such as short cutting boards or sorting when the system indicates color is out of spec.



The system allows the creation of a closed-loop color control system that minimizes the need for operator involvement while improving quality control and reducing material waste.

System Features:

Closed-Loop Color Control System:

- Touch screen PLC with color-control software allows easy operator set-up and control
- Closed-loop color control of color feeder speed based on L*, a* or b* process variables.
- The system automatically adjusts for bulk density variations of color concentrates, feed screw wear and other variations.
- Can be run in concert with gravimetric systems that control virgin, regrind and other additives.
- Color Specification and tolerances may be set for all variables and may be non-symmetric (example: L* tolerance may be +0.6 ΔE and – 0.3 ΔE)
- Ability to synchronize a line via Delta values.
- "Boost" speed designed to speed up color changes and reduce scrap by increasing material rate while searching for "stable" color. Stable color is defined by seeing a predetermined number of samples all falling within a set deviation of each other.
- Calibration reminders automatically displayed based on number of scans and time since last calibration
- Automatic logging of Out of Spec and Out of Tolerance conditions with detailed information about the process condition
- Screens provide detail on the number of times an alarm has occurred, as well as overall alarm list
- Historic data logging is done automatically and stored to a compact flash drive for retrieval via USB or remotely on a network by FTP
- All process variables are charted in real-time and can store 100 scans of data for viewing on screen
- Standards (recipes) may be stored to the system and retrieved using browse and search functions
- Standards may be modified anytime, as well as re-saved at the end of a run to maintain the latest set of parameters
- Feeder may be set into Manual Mode at any time and "locked" into this mode by password
- All critical areas are password protected

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