

TECHGUIDE SERIES:

Demystification of In-Line Automated Color Monitoring and Control for Digital Presses

Part 1: Introduction: Automated On-Press Color Control – The Technology and the Value Drivers

With scientific and engineering breakthroughs being daily or even hourly events in our modern society, there are fewer circumstances under which human interaction in a process is more effective than computer-aided machinery. The criteria for a selection between man and machine for a given task are usually quality of results, operating cost reduction, and productivity. Processes from the simple thermostatic control of room temperature to the complex control of the stability of an unmanned aircraft can best be accomplished by automated monitoring and closed loop feedback adjustment of critical operating parameters. Color control for digital presses is an excellent candidate for automation because it can provide improved quality along with operational cost reduction and increased throughput. The added benefit of a short-term return on investment for the print service provider creates a winning combination.

Automated systems for commercial, newspaper, and specialty printers have been successfully installed and operated worldwide over the past 10-12 years. There is measureable validation from this large installed base that high speed sheet-fed and web offset printing processes have benefited from the advent of automated color control. The use of true spectrophotometers has also been validated as an important tool to calibrate presses during make-ready as well as during press runs. The next step in this automated color correction evolution is to bring affordable in-line color control to digital presses. This can be achieved by cost reductions in high-speed, in-line color measurement instruments along with properly engineered and cost effective press integration. The reference here is specifically to web or sheet-fed inkjet and electro-photographic dry toner printing systems, which deposit colorants onto substrates without printing plates as opposed to lithographic, flexographic, gravure, or letterpress systems.

There are both operational and cost reduction advantages to automated color control on digital presses. The key system prerequisites to reaping these benefits include

- A multi band inline spectrophotometer which can make spectral measurements, color computations, and color corrections at update rates which exceed maximum press speeds
- Software that can display system color quality measurements and trending data to a press operator in order to provide on going press status
- Measurement insensitivities to distance variations between print media and spectrophotometer
- Ability to make color consistency measurements across the media width to identify print head non uniformities
- Feedback mechanisms and control points to adjust colorant densities on-the-fly when color discrepancies are detected

The resulting operational and cost reduction benefits include

- Automated initial colorant adjustments and on-the-fly setup for shorter make-ready time and reduced paper and colorant waste without a single sheet pull
- No interruption of press runs
- Offset color quality from a digital press
- Improved overall throughput and productivity

This paper will discuss several critical components of on-the-fly color monitoring and control for digital presses. At the outset, the reader will be grounded with a technical overview of a closed loop color correction system. This will cover the identification of major hardware and software components and their respective interactions to achieve the desired results. This will be followed by a discussion of how automated color control can have a positive impact on major cost drivers from make-ready to waste reduction and overall productivity. The paper will conclude with a description of a model system developed around the integration of commercially available components. The key objective is to identify an affordable printing system with automated on-the-fly color monitoring and correction which has a strong return on investment potential and can provide offset lithographic color quality from a digital press.