

# *What is the Potential of “Dynamic Response Color Control” ?*

A white paper by the management of Color Control Network

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Dynamic Response Color Control is a unique concept. It refers to the Color Control Network (CCN) system’s way of operating that allows it to respond, in real-time, to the current print conditions of any particular job. It has shown strong signs of being a major step forward in and becoming an integral part of “lean manufacturing” in commercial printing. *Is it the last missing crucial component in today’s printing enterprise and cross-enterprise management solutions?* The creators of the CCN system are confident that it is, especially in light of the JDF movement that allows integration of dissimilar products from specialized vendors, enabling seamless workflows.

Dynamic Response Color Control allows large and small print shops alike to manage the inevitable, numerous, and ever-changing variables that define print conditions, which commonly exist in commercial offset printing. These print conditions usually include the use of any one of approximately 3500 papers available on the market today, each one with its own optical gain characteristics. In addition, other variables most likely present are as follows: production proof deviations from specifications; choice of a press’s group-of-units; press mechanical drift; job-to-job specification changes such as screen ruling; color director preferences; pressman preferences; etc.

More importantly, Dynamic Response Color Control addresses the printer’s paramount and most burdensome areas of need he/she faces -- controlling the most meaningful quality and cost-efficiency issues they face. For instance, when it comes to controlling a print shop’s bottom line and keeping its customers satisfied, the color must come out at the end of the press, meeting the customer’s expectations without difficulty, aggravation and compromise, and in a cost effective way with the least amount of waste in paper, press crew’s time, and press time. *Accordingly, shouldn’t a system such as this be a part of every printing enterprise and cross-enterprise management systems?*

Many features of CCN’s system are used to create Dynamic Response Color Control. One example of this is CCN’s use of densitometry values in the modeling of the behavior of C, M, Y, and K colorants. But by far the most significant feature is the way CCN structures the characterizations of presses and proofing systems. Each CCN press or proofing system characterization is a “core framework model,” which is a type of profile. A core framework model is radically different from the “fixed one snapshot in time” descriptions found in conventional methods of press fingerprinting and proofing system profiling. Color Control Network defines this model as a “composition of the extensive definitions of the essential characteristics of a color reproduction device,” an example of a CCN “variable definition data” (VDD). Furthermore, and most important, CCN’s core framework model persists in the system as dynamically “remodelable” in order to conform to the requirements of the next job’s variables.

CCN’s core framework models are designed to work together with other core framework models or a myriad of other VDDs. Variable definition data are CCN generated profiles or selective-analogs that define each C, M, Y, and K colorant’s behavior as it is affected by the

following types of CCN defined variables: 1) Intrinsic, 2) Press Mechanics, and 3) Expert-Assessment Input. These variables are distinguishable in that each requires different methods to quantify its impact, normalize its representation, and compensate for its effects.

Intrinsic Variables are those that accompany the choices of printing presses, proofing systems, paper substrates for proofing and printing, as well as production proof deviations. The VDD defining Intrinsic Variables are represented by profiles.

Press Mechanics Variables are those that are part of the printing conditions at press characterization time cannot be not fully captured by the characterization process. For example, characteristics present at the time of the test-characterization-run that are proven by the Press Profile Initialization function not to be representative of the visual appearance of a press's day-to-day printing results. Another example of Press Mechanics Variables are those always occurring on presses with more than one "group-of-units" and require that graphic files which print on each of the "uncharacterized groups-of-units" be adjusted to print relative to the "characterized group-of-units." The VDD defining the Press Mechanics Variables are represented by selective-analogs data.

Expert-Assessment Input Variables are those known only by the hands-on, highly trained and experienced industry experts as reasons for particular unwanted (or wanted) changes in visual appearance of the print output. These variables are so numerous as to defy complete listing but may be included in broader categories such as press mechanical wear, press consumables change or deterioration, press chemistry variation, ambient climate changes, platemaking variation, color director preference (client and/or plant), and press operator idiosyncrasies. The VDD defining Expert-Assessment Input Variables are selective analogs data. Each of these variables may be calculated by using a CCN analysis tool. However, due to the usual production scheduling pressures and the transitory nature of these variables, it will most likely be determined through expert assessment.

Juxtaposed to "fixed one snapshot in time" descriptions, real-world cases of ever-changing print conditions, which Dynamic Response Color Control compensates for on a job-to-job basis, are innumerable. However, a few examples are as follows.

- 1.) At the last minute a "great deal" is found on a comparable paper for a large job. Financially the deal is too good to pass up, but even if the visual appearance of the paper is a perfect match to the original paper specified, the optical dot gain is different and will alter the printing characteristics of the press conditions.
- 2.) A shipment of paper appears to have a clay coating susceptible to "picking." The ink set must then have its "ink tack" numbers lowered, altering the printing characteristics of the press conditions.
- 3.) A client makes a last minute observation (with the press operator's help) that some critical deep blue colors on the job would show off the product better if the Cyan ink density was pushed up by .20, making these colors even deeper than shown on the proof, and demands this last minute change. This, of course, alters the Cyan printing characteristics throughout the tonal scale, not just in the deep colors.
- 4.) A fountain solution that the shop is accustomed to using is declared by the EPA to be harmful to the environment, so a new one must be

used, which changes the printing characteristics of every ink color on every press in the shop.

5.) The pressroom manager has noticed that on very cold days all the presses in the shop print lighter in the midtones, except for the yellow units.

The creators of the CCN system believe that colorimetry-based color management systems (as opposed to densitometry) have fundamental shortcomings that prevent them from offering the solutions provided by Dynamic Response Color Control. Colorimetry-based device profiles formats recognize only CMYK percent dot input values and Lab color output values and do not allow for the recognition of the behavior of each C, M, Y, and K colorant as affected by the multiple aspects of the printing conditions. Also, the concept of using selective-analog VDDs, or something similar, to address changes in specific print condition elements such as paper, production proof deviation, choice of press' group-of-units, etc. is nonexistent in colorimetry-based color management systems.

In a material manner, CCN's Dynamic Response Color Control offers a different direction than the one in which the commercial printing industry has been led.

So, we ask again, *is Dynamic Response Color Control the last missing crucial component in today's printing enterprise and cross-enterprise management solutions? Shouldn't a system such as this be a part of every printing enterprise and cross enterprise management systems?*

Fig. 1

