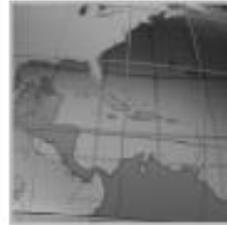


White Paper



Production Printing & Media



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Quality in Production Digital Color

Technology Advances through Canon's imagePRESS Digital Press

Service Areas

On Demand Printing & Publishing

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Table of Contents

Executive Summary..... 3

 Key Findings 3

 Recommendations 3

Introduction..... 4

The Growth of the Cut-sheet Production Color Digital Market..... 4

Gloss Optimization and Print Quality 5

 Toner 5

 Fusing..... 6

 Gloss Optimization Adjustments 7

Canon Color imagePRESS Product Overview..... 7

InfoTrends’ Opinion..... 9

About the Author 10

List of Tables and Figures

Figure 1: U.S. Production Color Cut-sheet Digital Print Pages (2014)..... 4

Table 1: Specifications of Selected imagePRESS Color Models 7

Figure 2: Canon’s imagePRESS Color C800 Configuration with Optional Feeding & Finishing 8

Executive Summary

With its imagePRESS color product line, Canon has taken steps to achieve high image quality and consistency while addressing a subtle yet important aspect of digital print—gloss. By leveraging gloss optimization techniques, Canon's imagePRESS color products are able to achieve gloss levels that better match the selected paper stock, and provide a look that is more comparable to offset.

Key Findings

- **Gloss optimization:** Canon's imagePRESS offerings produce gloss levels that are offset-like and, on top of that, Canon is one of the few vendors of dry toner electrophotographic products that give its users the tools to fine-tune the process to produce optimum results on the selected substrate.
- **Using digital and offset print interchangeably:** Gloss optimization is an important feature because it makes it feasible to use digital and offset print side by side effectively.
- **Moving digital print upstream affordably:** Products like Canon's imagePRESS afford users the opportunity to address higher quality print applications that allow them to gain new clients and extend their reach into existing ones.
- **Quality, productivity, and consistency:** The success of the imagePRESS products (and the ongoing opportunity for the recently introduced C700 and C800) builds upon a foundation of other technology advances that support accurate registration, color matching, broad media support, high resolution, process stability, and color management.

Recommendations

- **Examine the print samples:** See for yourself how Canon's gloss optimization technique makes a difference in printed output.
- **Compare output across a range of substrate types:** Evaluate print quality for a range of substrates (coated and uncoated, smooth and textured) on prospective devices. Examine how the shine of printed areas compares to unprinted areas on these substrates.
- **Talk to current users:** There is a large installed base of imagePRESS Color devices. See what these users have to say about productivity, reliability, workflow tools, and ease of use.

Introduction

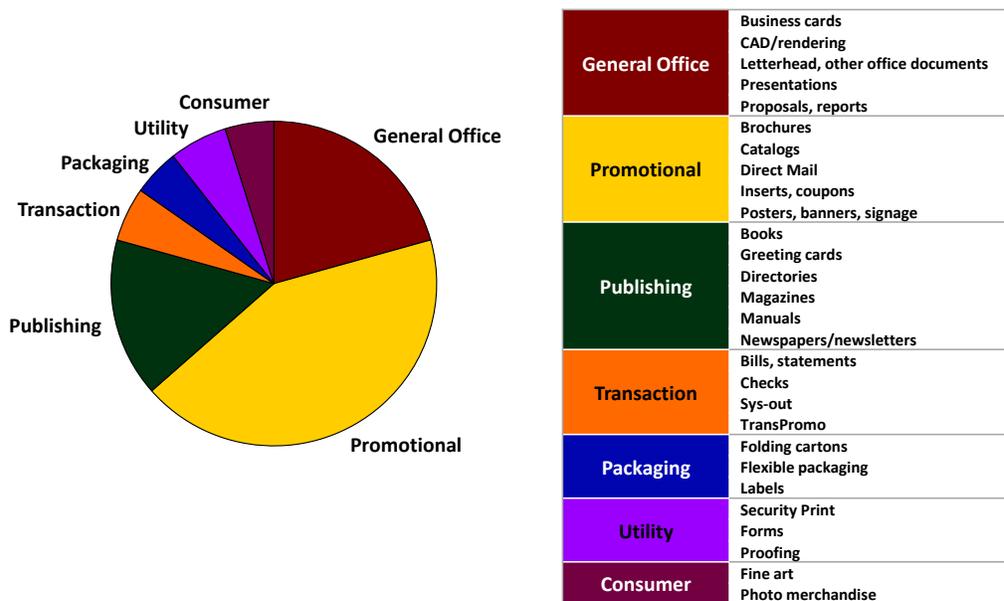
General commercial printers have long complained about the glossy output from production color digital printers on matte or uncoated papers. Although quality levels have improved dramatically since some of the earliest digital copiers and printers of the 1990s, it continues to be a challenge for some digital print devices to meet the high quality standard set by offset print. The thin transparent layers of offset inks provide a unique advantage that lets the matte or gloss finish of the paper shine through so that the entire sheet has a uniform appearance. Even so, the quality differential between four-color digital and offset has narrowed and, in many cases, it is very difficult to tell the difference between the two.

In this sponsored white paper, InfoTrends will examine how Canon has taken the key aspect of output gloss levels to give users the ability to adjust these to optimize the results for a specific media. This aspect of “gloss optimization” is important because it provides offset-like output and makes it possible to use digital and offset output interchangeably for a range of job types.

The Growth of the Cut-sheet Production Color Digital Market

There is a large and growing opportunity for production color digital print in the United States. In 2014, U.S. cut-sheet production color digital print volume was around 100 billion pages and growing at about a 4% annual rate according to InfoTrends’ U.S. *Production Printing & Copying Market Forecast: 2013-2018* study.

Figure 1: U.S. Production Color Cut-sheet Digital Print Pages (2014)



Source: InfoTrends’ U.S. Digital Production Printing Application Forecast: 2013-2018

The bulk of the production color digital printing is in promotional, general office, and publishing documents. Within those categories, the biggest segments are brochures,

direct mail, office documents (like presentation and letterhead), books, and booklets. Consumer applications driven by digital photography have also grown tremendously over the past few years.

Moving more volume from offset to digital print requires cost-effective and reliable products with high quality levels. One aspect that has limited the success of some digital print devices is the glossy shine of their output. Print service providers must be able to use digital and offset print interchangeably so that a digital and an offset print can be used side by side effectively, whether this is for different pieces that are used for the same campaign or perhaps the some document being printed at different points in the document lifecycle. If the digital print has a different gloss level than the offset piece, this will probably be an issue for the print buyer. This concern about gloss level holds true whether the campaign uses both technologies or even if it only uses digital.

In addition, a large amount of the cut-sheet digital color print volume produced today is made on light production devices. There is a growing opportunity in mid-level production, but to drive more digital print volume there requires productive and affordable mid-level production devices. New introductions from companies like Canon are giving users the tools to print higher quality applications for clients they may not have been able to reach before. At the same time, these tools help users extend their reach into existing ones, allowing them to gain more share of that customer's marketing dollars.

Another significant benefit of production color digital is unrelated to print quality. It is the value that comes from capabilities that are difficult or impossible to replicate with traditional offset print technologies. These include economical short runs, quick turnaround, forms replacement (for applications like transaction and direct mail), personalization & customization, mail automation (i.e., postal code sorts for postcards and other direct mail), print-on-demand workflows, and just-in-time manufacturing. When layered on top of the higher quality levels and the improved cost economics of production color digital print, it is no wonder that we are seeing continued growth.

Gloss Optimization and Print Quality

The imagePRESS C7000VP series was announced at the On Demand show in 2006 and offered what Canon calls "gloss optimization." Canon's proprietary gloss optimization technology tailors the gloss level of the printed image to that of the paper it is printed on.

Toner

The first contributor to gloss optimization is the toner. Prints from early color electrophotographic devices had the thick, layered look of a crayon drawing. Over time, system vendors discovered methods of depositing thinner layers of toner, which greatly improved quality levels. Nevertheless, in many cases, a glossy shine remained. The culprit was the fuser oil that is required by many electrophotographic systems. With the

introduction of Canon's imagePRESS C7000VP, Canon engineers developed a toner that did not require fusing oil. This is called "V toner."¹

The individual particles for Canon's V (Vivid-color) toner for the imagePRESS C7000VP and C7011VP series are composed of what Canon describes as "micro-dispersed wax and pigment" components. These tiny particles (5.5 microns) are designed to improve the melting performance during the fusing process so that smooth and consistent layers of toner can be applied to produce saturated colors on a wide range of media.

Canon took this a step further by allowing the user to control the gloss of the printed output. This is important, particularly in regard to providing quality levels that mimic the look of offset. The thin layers and transparency of offset inks and their interaction with the paper provides a uniform glossiness that is very appealing. Many electrophotographic methods have had trouble emulating this because fused toners tend to have their own gloss, irrespective of the gloss of the paper.

Yet Canon engineers discovered that the gloss of the toner could be better controlled with the right combination of toner formulation, fusing technology, and media-based controls. This concept of "gloss optimization" was put into practice in the imagePRESS C7000VP and has been part of the product line ever since, allowing the gloss of the final print to be appropriate to the paper that it is printed on.

Fusing

Electrophotographic systems typically fuse the toner to the page using heat. The paper is passed through the heated fusing system at relatively high speed. Canon engineers noted that, in addition to effectively fusing the toner to the paper, they could adjust the level of gloss by varying the temperature and the amount of time the sheet spends in the fuser based on the media type. Canon handles this adjustment in different ways depending on the specific imagePRESS product. There are two broad categories:

- **Dual fusing systems:** The imagePRESS C6000VP and C7000VP models (as well as their follow-on products, the current C6011VP and C7011VP) have two fusing systems that work in tandem. A sheet may pass through both as needed, allowing a great deal of flexibility in terms of heat and dwell time. Products in this class are generally capable of running all supported stocks at rated speed. The dual fusing systems make for a very robust product, but it also makes these systems more expensive than those that have only one fusing system.
- **Twin Belt Fuser:** The imagePRESS C700 and C800 models have a single fusing system that leverages technologies such as an Advanced Image Transfer Belt, Induction Heat technology, and an Advanced-Twin Belt Fuser. These systems produce excellent results and offer the ability to adjust for gloss optimization, yet they

¹ With the announcement of the imagePRESS C700 and C800, Canon introduced CV toner, another member of the V toner family. CV stands for "consistently vivid."

are implemented in a product whose acquisition price is within the reach of a much broader audience than the imagePRESS C6011VP and C7011VP.

Fusing the toner to the substrate involves a combination of voltages and temperatures as well as toner particles. Nevertheless, the important thing for an end user is not the technology, but the print applications and substrate range that it allows.

Gloss Optimization Adjustments

Canon's imagePRESS color series products are designed to produce output with a more offset-like finish right out of the box on qualified media. This is an inherent part of the system. Yet with gloss optimization, Canon has also put tools into the hands of the users that allow them to make adjustments on a paper by paper basis to control the gloss even further. These controls exist on two levels. At the most basic level, the user can identify a new substrate by a few key characteristics (i.e., basis weight, coating, and substrate type) so that the system can make the appropriate adjustments. More advanced users may wish to fine-tune the settings using expert-level controls. These settings can be saved as part of the media library associated with the imagePRESS print engine.

Canon Color imagePRESS Product Overview

Over time, there have been many products in the imagePRESS Color family with gloss optimization capabilities. Table 1 summarizes key specifications of some of the most recent ones.

Table 1: Specifications of Selected imagePRESS Color Models

Specification	C60	C700	C800	C6011VP	C7011VP
Max. speed ²	60	70	80	60	70
Resolution (dpi)	2,400 x 2,400	2,400 x 2,400	2,400 x 2,400	1,200 x 1,200	1,200 x 1,200
Toner type	CV toner	CV toner	CV toner	V toner	V toner
Min. paper weight	14 lb. bond (52 gsm)	14 lb. bond (52 gsm)	14 lb. bond (52 gsm)	16 lb. bond (60 gsm)	16 lb. bond (60 gsm)
Max. paper weight	80 lb. cover (220 gsm) ³	110 lb. cover (300 gsm)	110 lb. cover (300 gsm)	120 lb. cover (325 gsm)	120 lb. cover (325 gsm)
Fusing type	Twin Belt Fusing	Twin Belt Fusing	Twin Belt Fusing	Dual fusing system	Dual fusing system
Duty cycle	250,000	400,000	500,000	900,000	1,000,000
List price ⁴	\$83,750	\$113,900	\$136,900	\$226,000	\$271,000
Max. sheet size	19.2" x 13"	19.2" x 13"	19.2" x 13"	19.2" x 13" ⁵	19.2" x 13" ⁵
Min. sheet size	5.82" x 3.93"	5.82" x 3.93"	5.82" x 3.93"	7.2" x 7.2"	7.2" x 7.2"

² In letter sized pages per minute

³ Optional support up to 110 lb. cover (300 gsm) optional

⁴ Configuration varies by model and includes print engine, front end, and basic finisher

⁵ The imagePRESS C6011VP and C7011VP support long sheets up to 26"

Among the most recent additions to the Canon imagePRESS Color product family are the imagePRESS C700 and C800 models, announced in the fall of 2014. The imagePRESS C700 and C800 are multifunctional printers that fit in the mid-range production category with other products supporting monthly duty cycles from about 400,000 to 500,000 letter impressions per month. Users will likely produce average monthly volumes in the range of 30,000 to 100,000 letter impressions per month. The products have a compact yet scalable footprint, and support a range of in-line finishing capabilities. Canon has targeted users with high quality requirements who appreciate color accuracy and reliability across a range of substrates. These are also users who would value the gloss optimization capabilities that they have seen in earlier imagePRESS color products.

Figure 2: Canon's imagePRESS Color C800 Configuration with Optional Feeding & Finishing



The imagePRESS C700 and C800 extend the product family and offer some important advantages related to color quality and consistency to the low to mid-volume range class of digital production color devices. Though they share the imagePRESS name and many key features with the imagePRESS C7011 Series, they are built on a new smaller footprint platform and leverage a range of new technologies. This has allowed Canon to introduce a solution to the low to medium volume market space that delivers the quality levels expected of the imagePRESS color line.

InfoTrends' Opinion

The impact of gloss optimization in terms of output quality is an important one for all types of printers, but particularly for commercial printers who leverage digital and offset printing technologies in their shops. Combined with other Canon technologies, the imagePRESS Color product line is developing a strong reputation for color quality, consistency, and reliability. The quality speaks for itself, as you can see from print samples provided by your Canon sales representative. With the introduction of the imagePRESS C700/C800, Canon has made the capabilities of the imagePRESS family available to a broader segment of print service providers. This extension to the light and mid-production markets is a continued demonstration of Canon's long association with production color print, going all the way back to the 1990s, when it introduced the CLC 1. It shows how strongly Canon is committed to the production color digital print market and the value it delivers to its customers.

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