GCR - FROM SCIENCE TO BUSINESS

a new poster guide for the graphic arts industry

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PREFACE

While most papers presented at TAGA describe in-depth research and findings on processes and materials for the graphic arts, this paper aims to simplify a wealth of scientific studies already submitted to TAGA and other graphic arts educational institutions. In fact, this paper rests on findings and research done by a number of scientists that have elaborated extensively on the issues of GCR or grey component replacement. To further support this paper, extensive tests have been performed on a wide variety of color separation equipment, web press runs under standardized production conditions and scientific measuring procedures of separation films and press sheets. However, this paper will not elaborate further on the actual test work but will use the findings to propose and introduce a simplified summary as an everyday working tool for the successful application of grey component replacement for most printing processes. This summary is being offered to the industry in form of a poster guide to be placed at prime areas of production such as the scanner room, press room, advertising agency, and other areas where quick and easy reference to GCR applications are desired. (Poster size 25 X 38 in.)

THE GCR GUIDE, NEEDS AND OBJECTIVES

With the re-emergence of this unique process, about four years ago in Europe it became quite evident that the rather complex issues of grey component replacement, hereto referred to GCR, were not easily understood by the industry at first. The use of numerous names and abbreviations by manufacturers and users of color separation equipment where GCR is essentially originating added to the confusion in the industry. Most different names used, however, describe essentially the same process on its results and lend little room for individual approaches to the process. GCR is based on a scientific model of the color reproduction and printing process and, therefore, is governed by its respective laws, equations, and established standards.

Despite a flood of papers, dissertations, and articles written on the subject of GCR , it became quite apparent that the industry needed a

more clearly defined simplified set of recommendations for every day use that would aid communication between the separator, the printer, and the print buyer.

A meeting of applications specialists of most major color scanning equipment manufacturers set the basis for a joint effort to discuss means for clarification and possible standardization of the GCR process. This early task force, under the guidance of the Graphic Communications Association , has since grown to include major American offset and gravure printers, trade houses, ad agencies, film, and paper manufacturers. Its work and accomplishments have been published and presented periodically to the industry. Since the test phases and their specific results were relatively complex, the task force decided to issue its major findings and recommendations for successful GCR applications in form of a much simplified easy-to-read and follow guide. For ease of use and visibility, a poster format was deemed to be the most effective means of publication. The resulting guide represents a mere summary of the most important findings of the test and evaluation phases.

The objectives of the GCR guide were set as follows:

1. To provide easy and quick reference for:

    - color separators
    - printers and press operators
    - print buyers and art directors
    - quality control personnel
    - print production personnel
    - educational institutions

2. To provide basic understanding of the GCR process.
3. To provide basic application procedures for most printing processes.
4. To provide basic operational windows for safe application of GCR.

These criteria were to be integrated into a simple visual design for a poster. Simplicity was key to the design without sacrificing the most important aspects and necessary information for every day use.

USE OF THE GCR GUIDE

The GCR poster guide is separated into three basic components:

- Basic definitions for applications and process components (see #1)
- Reference chart for process application (see #2)
- Visual series of GCR print composites (see #3)

The basic definitions for applications are considered to be an important part in the design of this guide. In fact, most of the confusion about the GCR process originate in misinterpretation of basic definitions and their impact on the reproduction process. Issues of GCR versus UCR as well as the importance of UCA (undercolor addition) have been debated and clarified extensively in the industry. However, the GCR guide offers only short and concise phrases of definition to maintain its simple format and does not, at least in its first edition, offer extensive explanations on those components.

The reference chart in the center of the GCR guide is the most useful portion for every day use. It aims to provide quick reference on the impact of GCR throughout its useful range of application. This range was considered to be between 40% and 100% of grey component removal shown clearly in the vertical left column of the reference chart (see #4).

The main users or beneficiaries of the GCR process during the production process are the scanner operator, the press operator, and the art director or print buyer. Each of them will view and use the GCR process from a different stand point and relates to a different set of parameters. The chart, therefore, relates to these users in different vertical columns called:

- Prepress (scanner or systems operators, dot etchers) see #5
- Press room (press operators) see #6
- Appearance (print buyer, art director, print production) see #7

In cross reference with various degrees or percentages of GCR applied, the above users will be informed or alerted on the possible impact of GCR on a wide variety of production conditions. Again, for reasons of simplicity and easy reference, the explanations are kept to short and concise one-liners and do not offer in-depth explanations. In addition to written information, the chart offers a "safe window" feature using tinted color areas. These "windows" in the reference chart are represented by color tints in "traffic light" fashion indicating operational areas for GCR ranging from "safe" to "extreme caution". The colors of these windows are:

GREEN = Area of safe and best overall performance.

FIRST EDITION **GCR** JANUARY 1987

GREY COMPONENT REPLACEMENT

GUIDE

READ THIS FIRST

[illegible]

DEFINITIONS

Conventional [illegible]

GCR Grey Component Replacement [illegible]

UCR Undercolor Removal [illegible]

UCA Undercolor Addition [illegible]

TAC Total Area Coverage [illegible]

GREEN AREA [illegible]

YELLOW AREA [illegible]

RED AREA [illegible]

GREY AREA [illegible]

GCR %	PRE-PRESS	PRESS	APPEARANCE
	MAIN ADVANTAGES: [illegible]	MAIN ADVANTAGES: [illegible]	MAIN ADVANTAGES: [illegible]
	CONSIDERATIONS	CONSIDERATIONS	CONSIDERATIONS
100%	[illegible]	[illegible]	[illegible]
90%	[illegible]	[illegible]	[illegible]
80%	[illegible]	[illegible]	[illegible]
70%	[illegible]	[illegible]	[illegible]
60%	[illegible]	[illegible]	[illegible]
50%	[illegible]	[illegible]	[illegible]
40% AND BELOW	[illegible]	[illegible]	[illegible]

[illegible]

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National Affiliate of PIA
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YELLOW = Area of minor concerns to overall performance.
RED = Area of major concerns to overall performance. Disadvantagesmay outweight advantages.
GREY = area of relatively little improvement over conventional, non-GCR separations. Advantages of GCR not fully realized.

These color windows and their relative indication of performance are merely meant as recommendations for overall use of GCR and should not prevent the user to exceed these windows in either direction. With proper care and full understanding of all ramifications, GCR may well be used beyond these windows to achieve any particular advantage of the process. For example, if higher ink savings, higher press speeds, and maximum run stabilization is required, GCR application in the 90-100% areas may be used if resulting drawbacks can be controlled or accepted.

The visual series of GCR print composites is the third component of the GCR guide and provides simple visual interpretation of applied GCR as an educational or reference tool (see #3). The series shows progressive composites of:

- 4-color composite
- Black printer
- 3-color composite

They are arranged in a unified series from left to right. Starting at the top left corner with a conventional set of separations from a scanner, the series continues on the perimeter of the poster in increments of 10% applied GCR from 40% to 100%. This series gives a simple visual impact of GCR for the 3-color composites and complementary black printer while the 4-color composite stays the same throughout the entire series.

SUMMARY

After much confusion and misinterpretation, the GCR process with its unique advantages is used extensively now in North America. The use of older scanning equipment which is rarely equipped with the proper facilities for GCR has in the past prevented many users to apply GCR. Newer models of all makes are perfectly capable of producing well balanced GCR separations. Failures to yield proper results with applied GCR are in most cases attributed to problems with the basic color program in the scanner rather than the GCR routines. It must be

understood that GCR does not stand on its own as a process in a color scanner and must be regarded as an integral part of a well set up color program. One of the unique aspects of the GCR process is the fact that no one single faction of either prepress, press or quality control can exert individual control over the process and relies almost exclusively on color computation software in the respective color scanner or imaging system. This fact makes GCR, despite its inherent complexity, very simple to use. In newer equipment, the decision making process for applied GCR has, therefore, been reduced to essentially two aspects:

1. How much GCR to use
2. How much UCA is required to maintain proper shadow density on a particular set of paper and ink.

Once properly programmed, any late scanner and system will produce high quality GCR separations. The GCR guide represents an excellent tool for most any GCR application. This guide is available presently in its first edition and as the research of the GCA study group as well as industry feedback requires, the guide will be subject to updates and revisions.

The guide is available to the industry through GCA, Graphic Communications Association, 1730 North Lynn Street, Arlington, Virginia 22209.

The following companies and representatives have contributed to the research of the GCA GCR Study Group and the making of this Guide.

Crosfield Electronics
Hell Graphic Systems
Eikonix Corp.
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3M Company
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Gamma One
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Saatchi, Saatchi, Compton
Oakland National Engraving
Westvaco Paper
System Brunner
Rosos International
Time Inc.
R.R. Donnelley Company
Newsweek
McGraw-Hill
Editors Press
World Color Press
Shenendoah Valley Press
U.S. News & World Report


GCR
GREY COMPONENT REPLACEMENT
GUIDE
READ THIS FIRST
DEFINITIONS
Conventional
GCR
UCR
UCA
TAC
GREEN AREA
YELLOW AREA
RED AREA
GREY AREA
GCR %
PRE-PRESS
PRESS
APPEARANCE
100%
90%
80%
70%
60%
50%
40%
AND BELOW
1
2
3
4
5
6
7
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