FLAAR Reports

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May 2009

Books and Publications on Color Management & ICC Color Profiles

Book Reviews and Annotated List

Contents

Introduction

Many of the titles here were already in the FLAAR Reports, as references for Nicholas Hellmuth's glossary. However we noticed that most training programs on color management failed to include even a basic list of suggested reading. And virtually no training program offered a totally comprehensive bibliography.

So in October 2003 we decided to add this new title to the color management series: "Recommended Reading." We have updated this several times, most recently in January 2006, and October 2008.

In the process of writing this bibliography we also were surprised to notice that most books on color management, excellent as they are in their own right, totally lack references and usually fail to even include a list of recommended reading.

FLAAR feels this is something that a university professor does well – tracking down publications, articles, and references, and annotating them. The annotations indicate which titles are worth your special attention. The value of Hellmuth's annotations is that we do not sell books, nor are we otherwise beholden to any particular publisher. This is a polite way of saying that our reviews can be honest because we are not being paid by anyone.

Nicholas and Mandy (color management consultant) at client customer site in Hawaii.

Nicholas and Juan Luis with a few of the color management books at the FLAAR office.

Books specifically on Color Management

Many of the book reviews included here come from a FLAAR report which is part of the digital photography course which FLAAR offered. However for this stand-alone report in the color management series we updated that by adding new titles, overall made it comprehensive, and then edited the content so it might be easier to read. We hope you like the results.

The best book on color management to date is called "Real World Color Management," Peachpit Press (all their books are great). Authors are Bruce Fraser, Chris Murphy, and Fred Bunting. Buy this book immediately. Just be sure you have the second edition and set aside a rainy weekend to actually read it, and then additional time to practice with the tools and software.

ADAMS, Richard M, II and **Joshua B. WEISBERG**
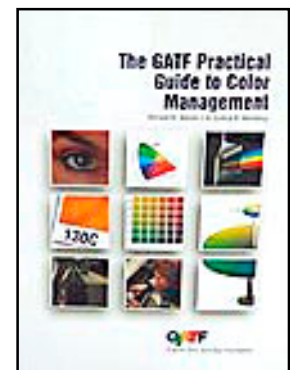1998. The GATF Practical Guide to Color Management. GATFPress, Pittsburgh.

216 Pages

Discusses color management in general. Has only three pages on color management for digital photography. Not otherwise oriented either to digital photography nor to inkjet printing. Nonetheless, well written, nicely illustrated, and lots of facts on specific products (hardware and software for color management). The first chapter is almost identical to that of the other GATF book on color management but after that they diverge. I read them both the same day and other than the first chapter I learned something new in each of these books.

Includes a scanner software test chart.

Since many of the color management products mentioned in 1998 are no longer available or obsolete, and as some of the companies have gone out of business, merged, or sort of are not on top anymore, look at the 2nd edition, which is also already eight years out of date, or nine, if you figure it was probably written a year before it could be published. Fortunately

> **Contents:**
> - Introduction
> - Color Theory
> - Closed-Loop Color
> - Color Measurement
> - Color Characterization
> - Color Management Profiling Software
> - Integrating Color Management
> - Visual Color Evaluation
> - Color Management Tools for Users
> - Appendices
> - Glossary
> - Index

ADAMS, Richard M, II and **Joshua B. WEISBERG**
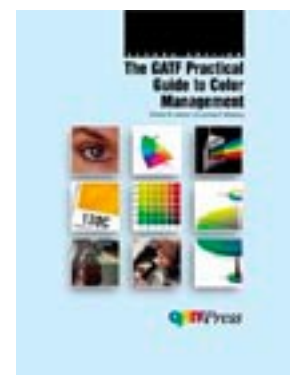2000. GATF Practical Guide to Color Management. 2nd edition. GATFPress.

We do not yet have the update at hand, but will check it out. Most updates of this nature are a considerable improvement over earlier versions.

260 Pages

> **Contents:**
> - Introduction
> - Color Theory
> - Closed-Loop Color
> - Color Measurement
> - Color Characterization
> - Color Management Profiling Software

- Integrating Color Management
- Visual Color Evaluation
- Color Management Tools for Users
- Appendices
- Glossary
- Index

ADAMS, Richard M, II. SHARMA Abhay and **SUFFOLETTO, Joseph**
2008. Color Management Handbook: A Practical Guide. GATFPress. Pittsburgh.
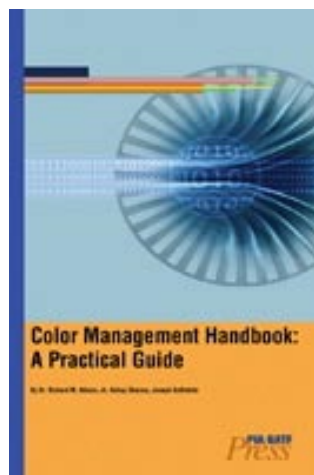
Dr Richard Adams launched his latest book, entitled Color Management Handbook: A Practical Guide. The text provides explanations and procedures for practical color management. Despite the relative maturity of the topic, color still ranks as one of the main issues in digital camera capture and managing soft and hard copy proofing. This latest title is an invaluable guide to photographers, printers, end-users and everybody who wants to control and manage color. The text reviews the latest products and procedures — if you are into color you need this book! The text is published by PIA/GATF and is co-authored with Abhay Sharma and Joseph Suffeleto.

Color Management Handbook: A Practical Guide grants you valuable insight into the subject through a comprehensive range of topics:

Contents:
- Color appreciation
- Color measurement
- Color management for input devices
- Color management for monitors
- Color management for printers and presses
- Profiling applications
- Color utilities
- Color management for packaging
- Color-managed workflows
- Non-ICC applications
- Visual color evaluation

AGFA

1997. The Secrets of Color Management. Agfa Educational Publishing, Randolph, MA.

An excellent booklet for a general introduction. Worth tracking down, even used. The illustrations are among the best available.

32 pages, naturally all in color.

Contents:
- The Digital Reproduction Workflow
- What is Light?
- How do we Perceive Color
- How do Colors Mix?
- Color Models
- Why is Color Management?
- Input Limitations
- Bit Depth
- Characterizing Input Devices
- Monitor Limitations
- Characterizing Monitors
- Output Device Limitations
- Characterizing Output Devices
- Color Separation
- Principles of Digital Proofing
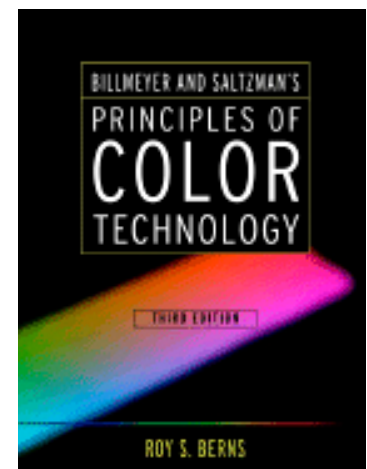- Color Management Today
- Glossary

BERNS, Roy S.

2000. Billmeyer and Saltzman's Principles of Color Technology, 3rd Ed
       New York.

304 Pages

Contents:
- Defining Color
- Describing Color
- Measuring Color
- Measuring Color Quality
- Colorants
- Producing Colors
- Back to Principles
- Mathematics of Color Technology
- Bibliography
- Index

BOHNEN, Roy and **Sean O"LEARY**
2001. Fundamentals of Large-Format Color Management. International
      Reprographic Association, Oak Brook, IL.

77 page booklet by knowledgeable authors. Worth acquiring, however real-
ize that many illustrations are identical to those in the free booklet by X-Rite.
Similarly among various GATF publications on color science, often the same
material is in several books. This is natural because the basic material on
color science has not changed much over the years. When a good illustration
is already available, makes sense to use it.

First appendix nicely lists software products, but is two generations (versions)
out of date (circa 1999 or 2000; for example, still on Gretag version 3; current
version is 4.1).

You should be able to obtain this from Chromaticity, rbohnen@chromaticity.com, 616 874-2779 ext
124. Not free but worth its price as long as you don't expect a book which explains step by step what
you have to do.

Contents:
- Introduction to Color Theory
- Additive and subtractive color spaces
- Introduction to color range
- Device-independent color spaces
- How color is built
- Principles of calibration
- Image capture devices
- Color look-up tables
- International Color Consortium: Introduction to profiles
- Profiles and the workflow
- RIP's (raster Image Processors)
- Appendix

No glossary. No index. No bibliography nor any other list of references nor where else to find info.

BOURGES, Jean
1997. Color Bytes Blending the Art and Science of Color. Chromatics Press, Forest Hills, NY

This 159 page book was sold by Agfa Educational Publishing (which I would be surprised if it still exists).
I do not include this book because it is on color management, but it definitely is on color and very well
presented. Another thing I like about this book is that it is reader-friendly. So if you simply want to learn
about color in an easy-going manner, get this book at a local library and enjoy it.

Contents:
- Basic of Bourges
- Choose One
- Black is the third dimension
- Warm or cool
- Opposing Colors
- Four-Color Harmony
- Postscript
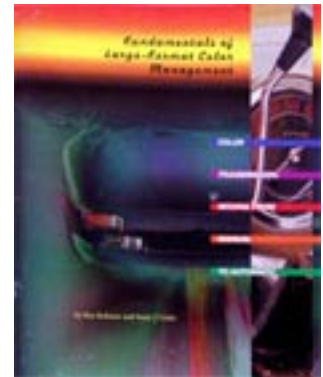
BRUEES, Stefan, MAY, Liane, and **Dietmar FUCHS**
1999. Postscriptum on Color Management: Philosophy and
       Technology of Color Management. LOGO GmbH
       (GretagMacbeth).

This is the kind of book you would expect a German or Swiss color scientist to write. Despite that, it is actually quite readable. Sometimes at tradeshows you can wrangle a copy from the GretagMacbeth booth. If you buy one of their nice products you ought to try to get the book thrown in as a bonus.

Surprising for a German professor: no bibliography, no index. Being a European book don't expect such handy reader-friendly features such as a glossary. Nonetheless this is essential reading and worth tracking down.

Contents:

- Why Color Management?
- An Introduction to Colorimetry
  - The perception of color
  - Additive and subtractive color mixing
  - Color temperature and light source
  - The development of the CIE chromaticity diagram
  - The development of visually equidistant CIE color models
  - Color collections
  - The difference between color measurement devices
- Components of a Color Management System
  - Color space conversion
  - The four ICC rendering intents
  - What is an ICC color profile?
  - Developing ICC device profiles
  - The mechanisms of an ICC profile
  - The ICC standard
  - Other ICC compatible color profile formats
  - The color management module
  - The architecture of Apple ColorSync
  - LogoSync and other ICC color management modules
  - Ideal ICC compatible applications
- Calibration and profiling an input and output systems
  - Calibration of input and output systems
  - Monitor calibration
  - Calibration of digital color printing systems
  - Standardization of conventional prepress printing
  - Processing measurement data
  - Measurement conditions
  - Measurement geometry
  - Influencing the color target
  - Processing the measured data
  - Correcting print variations in individual prints

- • Correcting print variations within a print run
- • Updating the print run measurement data over an extended period of time
- • Generating a master measurement file for different presses
- • Correcting gradation variations
- • Profiling input and output systems
- • Profiling monitors
- • Profiling scanners and digital cameras
- • Output profiling
- • Separation in a color management system
- ▪ Implementing color management today
    - • Color management for Macintosh
    - • Color management for Windows
    - • Color management in PostScript
    - • Data formats, PostScript, and BatchMatcher PS
    - • Color management in the OPI server
    - • Media independent image databases
    - • PDF and color management
    - • Color management in the World Wide Web
- ▪ Color management in Photoshop and QuarkXPress
    - • Adobe Photoshop 4.0.x
    - • Adobe Photoshop 5.x
    - • ICC compatible plug-ins for Adobe Photoshop
    - • QuarkXPress 3.3.x
    - • QaurkXPress 4.0.x

DALY, Tim
2005. The Digital Color Printing Handbook: A Photographer's Guide to Creative Color Management
and Printing Techniques. Amphoto Books.

160 Pages

Contents:
- • Why color control is essential
- • Hardware tools
- • Software tools
- • Managing color
- • Proofing, preview and prediction
- • Enhancing color
- • Changing color
- • Color recipes
- • Color techniques
- • Special techniques
- • Troubleshooting and resources

Nicely presented book but what is disconcerting is that up front they feature an outdated Kodak medium format back. Kodak is long ago no longer an entity in professional digital photography. In general, the tone is low-end to mid-range: definitely not high-end pro. Pros use 33 to 39 megapixels in 2006 (okay, these were not available in 2004 when a book published in 2005 was written). But 129 MB files were available from a BetterLight already many years ago; even back in the 1990's files from a large format tri-linear scanning camera were substantial. So the author's comments on how much power you need are all the more consumer-oriented and pro-sumer. This is logical, since there are more people in this situation to buy a book. A book just directed to BetterLight owners would not be commercially realistic.

Has an index, and glossary, but no bibliography, all the more surprising for a person at a university.

If printers are to be mentioned, them metamerism, gloss differential, bronzing and all that need to be included. These are seemingly not in his vocabulary, nor are any printers besides Epson.

Everyone seems to have problems deciding whether manipulation color in Adobe Photoshop is related to color management. The answer is NO. You need two separate books: color manipulation, and color management. There is not really a relationship between the both (at least in theory).

As I continued to read I noticed this was really a book on tweaking color in Adobe Photoshop. It is not a book on color management whatsoever. This is a book for those who don't ever intend to use ICC color profiles, but then why bother to profile your scanner or profile your monitor?

I was very disappointed.

It is typical that book publishers pump up titles or sub-titles with catchy keywords, but in more than 50% of the books that claim to be on color management, they are really on color balance which is totally and absolutely different.

Tim Daly is a perfectly good photographer; has years of experience. But this book has zero to do with color management other than how to calibrate your monitor. The title claims it is on digital printing: sorry, the book has effectively nothing to do with color printing other than a few snapshots of low-end desktop printers.

Amphoto Books is one of the best publishers of books on photography, so hopefully they will do better next time.


DREW, John T. and **MEYER, Sarah.**
2008.   Color Management: A Comprehensive Guide for Graphic Designers. Rotovision, East
             Sussex, England.

224 pages

> **Contents:**
> - Introduction
> - The Terminology of Color
> - Basic Color Theories
> - Additive Color Theory
> - Subtractive Color Theory
> - 3-D Color Theory
> - The Creation of Color Wheels
> - The Spectral Range of Color Wheel
> - Color Legibility
> - Readability
> - Contrast
> - Warm and Cool Matrix
> - Utilizing Field Colors with Text Type
> - Color Calibration and Overprint
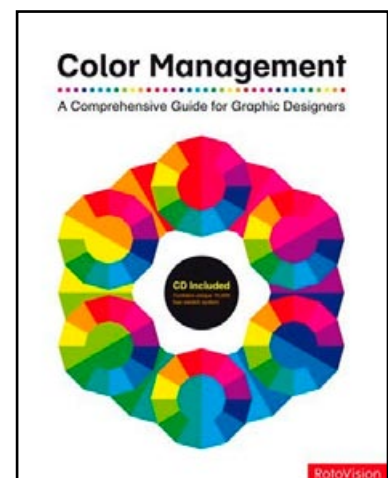
- Quality of Color Proofs
- Color Prepress and Printing
- Dot Gain
- Undercolor Removal
- Pixel, Lines, and Dots per Inch
- Bit Deph Range and Raw Formatting
- Printer Order
- Color Correcting Images for Press
- Type Reversals and Knockouts with Solids, Tints, and Shades
- Behavioral Effects of Color
- Micro Color Responses
- Macro Color Associations
- Acknowledgments
- Contributors
- Index

FIELD, Gary G.
1998. Color and Its Reproduction. 2nd edition, GATFPress, Pittsburgh.

Has a lengthy glossary, albeit technical and not illustrated. However most of the concepts are illustrated in the book itself. If you prefer an illustrated glossary, most Agfa publications are actually in a glossary format – the whole Agfa booklet is a combination of text with illustrations but practically in glossary format.

As you would expect for a book written by a color scientist, the GATF book has an extensive bibliography. The publishers also provide an ample index.
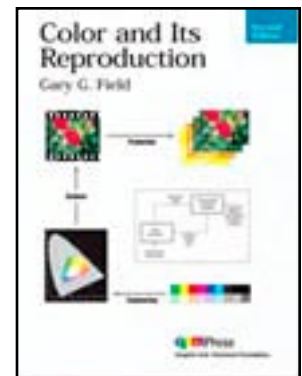
Books by GATFPress are written by color scientists for offset and related traditional press methods. Although these monographs do not include inkjet printing technology, the basic principals of color are the same. If you are a printer operator in any professional setting, it would be useful to peruse the various GATF publications. Find them at a library and then order the specific titles you feel you would like to keep. That is because out of the approximately four GATF titles, they naturally all tend to cover the same basic core material relative to offset printing color management.

It would be helpful for this class of color specialist to address the problems of inkjet color management. So far, the friendly folks at Chromaticity come the closest.

Contents:
- Preface
- History of Color Reproduction
- Color Theory
- Color Systems
- Color Perception Fundamentals
- Complex Image Color Perception
- Color Measurement and Specification
- Paper and Ink

- Color Printing
- Printing Systems Analysis
- Color Originals
- Color Reproduction Objectives and Strategies
- Color Separation
- Color Proofing
- Color Communication
- Color Quality Strategy
- Appendix A: Symbols and Abbreviations
- Appendix B: Color-Related Standards and Specifications
- Appendix C: Color Difference Equations
- Appendix D: Equations for Color Reproduction
- Appendix E: Sources of Standards and Related Technical Information
- Glossary
- References

FIELD, Gary G.
2001. Color Essentials: Color and Quality for the Graphic Arts and Sciences, Vol. I. GATF.

Contents:
- Color Reproduction Objectives
- High-Fidelity Color
- Gray (Color) Balance
- Color Saturation
- Color Halftoning
- High-Resolution Color
- Color Image Sharpness
- Fifty Years of Color Scanning
- Digital Color
- Predicting Color Reproduction
- Color Printing Quality

FIELD, Gary G.
2003. Color and its reproduction: Fundamentals For The Digital Imaging And Print Industry.

Contents:
- Color Perception basics
- Complex Image Color Perception
- Color Measurement
- Color Reproduction Principles
- Color Imaging Progress
- Digital Color Systems
- Paper and Ink
- Color Printing
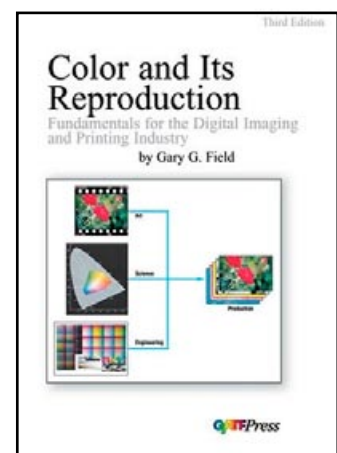
- Printing System Calibration
- Color Reproduction Objectives and Strategies
- Color Separation
- Color Correction
- Color Proofing
- Color Specification Techniques
- Color Communication
- Appendices
- Glossary
- References
- Index

FRASER, Bruce, MURPHY, Chris, and **Fred BUNTING**
2002. Real World Color Management. Peachpit Press, Berkeley.

An excellent book which describes everything. Nice long descriptions, with plenty of illustrations and examples. Some chapters are veritable glossaries in themselves. However this is not a practical guide for the lost soul who just needs to know how to do linearization and custom profiles to get his/her colors right in the final inkjet print. 533 pages are simply too much for the average mortal. I have considerable interest in learning color management, but I fell by the wayside after about 350 pages. Not that the book is bad, but that it explains too much detail about everything under the sun related to color management. In the process it neglects to walk the lost soul through what they have to do out in the print shop, starting at a print with an angry artist demanding to know why their inspirational colors in the original oil painting did not reproduce in the inkjet (giclee) print.

Includes an ample index, a useful 20 page glossary, but no bibliography. That's right, not a single solitary list of books, as though nothing else on the planet had ever been written on color management. Not any kind of references nor where else to find info. Within the text, books by other authors are cited from time to time. However a book on a technical subject with no bibliography is almost a contradiction of terms.

Still, we recommend this book as among the best available so far. The authors definitely know the material inside out.

Just be sure you get the second edition and then set aside a rainy weekend to actually read it, and then additional time to practice with the tools and software.

FRASER, Bruce, MURPHY, Chris, and **Fred BUNTING**
2005. Real World Color Management, Second Edition. Peachpit Press, Berkeley.

Sub-titled: Industrial-strength production techniques. Indeed the front cover says it all: "Techniques for accurate, consistent color reproduction." The book combines that kind of help along with "Expert advice on building, evaluating, and editing ICC profiles."

Our evaluation copy of the book just arrived. It is 582 pages!

The same day we also got our copy of Dan Margulis, "Photoshop LAB Color" (how to correct color in Adobe Photoshop but using the CieL*A*B* color space and not intuitively in traditional RGB). 366 pages plus a CD.

So that is about a thousand pages of material that I am supposed to read in my normal office hours.

It is now three years later (December 2008) and I am perusing this book in more detail. The first thing I notice is that this book is on color management in general: this is not a book on color management solely and specifically for inkjet printers. But it does cover inkjet printers and is by no means devoted entirely to offset presses. But in every chapter it has sections on offset presses, toner laser printers, RGB laser-light printers (LightJet, Durst Lambda, etc).

This is a good book for a general introduction to basic concepts. But this is not whatsoever a step by step book on color management workflow for wide-format inkjet printing. I recommend that you buy this book to read, but do not expect to be able to actually do color management with this book. But this is not a reason not to buy it. Besides, I have not yet found a step by step book on color management for inkjet printers that really provides what the PR releases claim that their book offers.

Also realize that in this year 2009, that a book published in 2005 was written in 2004. This is a polite way to say that today there are new tools, better software and different expectations.

Contents:
- Overview: The Big Picture
- Contents: What´s Inside
- Preface: The Color-Management Conundrum
- Introduction to Color Management
- What is color? Reflections on life
- Computers and color: color by the numbers
- Color Management: how it works
- All about profiles: describing devices
- Building and tuning profiles
- Measurement, calibration, and process control: "the map is not the territory"
- Building display profiles: your window to color
- Building Input profiles: Starting out right
- Building output profiles: final destinations
- Evaluating and editing profiles: color orienteering
- Applications and workflow
- Color-management workflow: Where the rubber meets the road.
- Color management in the operating system: Who does what to whom, when?
- The adobe common color architecture: Color Management in adobe photoshop, indesign, and illustrator
- Color Management in Macromedia freehand 10: Capable but quirky.
- Color Management in CorelDraw 10: It manages everything but its own files
- Color Management in Quarkxpress: Incremental Improvement
- Color Management and PDF: the wave of the future
- Automation and scripting: The smart way to be lazy
- Building Color-managed workflows: Bringing it all together the four stages of color management
- Appendices

GIORGIANNI, Edward J. and **Thomas E. MADDEN**
1998. Digital Color Management: Encoding Solutions. Prentice Hall.

If these are the people who invented the Kodak Photo CD system I just hope their book is less oriented to low-end, entry-level (which was the original intent of the Kodak Photo CD system). I also hope they don't push the same color scheme inflicted by Kodak Photo CD either. However since this book does discuss the dreadful Kodak Photo YCC scheme, if you have ever used a Kodak Photo CD, you need to get this book. Also be sure to read the book "Official Kodak Photo CD Handbook," by Peachpit Press. Out of print but worth getting via Interlibrary Loan.

Contents
- Foreword
- Preface
- Introduction
- Fundamentals
  - Measuring Color
  - Color-Imaging Systems
  - The Human Color-Imaging System
- The Nature of Color Images
  - Video Images
  - Reflection Images
  - Photographic Transparencies
  - Photographic Negatives
- Digital Color Encoding
  - Encoding Concepts
  - Densitometric Color Encoding
  - Colorimetric Color Encoding
  - Photo CD Color Encoding
  - Color-Encoding Data Metrics
  - Output Signal Processing
  - Myths and Misconceptions
- A Unified Color-Management Environment
  - Color-Management Paradigms
  - Unified Paradigm: Basic Properties
  - Unified Paradigm: Color Encoding
  - Unified Paradigm: A Prototype System
  - Unified Paradigm: Color Interchange
  - Unified Paradigm: Overall System Architecture
- Final Thoughts and Conclusions
- Appendices
  - Colorimetry
  - Densitometry
  - Photographic Media
- Adaptation
  - Viewing Flare
  - PhotoYCC Color Space
  - Transformations for Color Interchange
  - PhotoYCC Space to Prototype CES
  - Prototype CES to Photo YCC Space
  - PhotoYCC Space to YC(b)C(r)
  - PhotoYCC Space to Cineon 522

- Prototype CES to FlashPix NIFRGB
- Photo YCC Space to FlashPix NIFRGB
- Glossary
- Recommended Reading

GIORGIANNI, Edward J. and **Thomas E. MADDEN**
2009. Digital Color Management: Encoding Solutions. Second Edition. Wiley

Contents:
- Series Preface
- Acknowledgement
- Introduction
- Fundamentals
  - Measuring Color
  - Color-Imaging Systems
  - The Human Color-Imaging System
- The Nature of Color Images
  - Electronic Displays
  - Electronic Imaging Systems
  - ReflectionImages
  - ProjectedImages
  - Photographic Negatives
- Digital Color Encoding
  - Encoding Concepts
  - Densitometric Color Encoding
  - Colorimetric Color Encoding
  - Scene-Based Color Encoding
  - Color-Encoding Data Metrics
  - Output Signal Processing
  - Myths and Misconceptions
- A Unified Color-Management Environment
  - Color-Management Paradigms
  - A Unified Paradigm: Basic Properties
  - A Unified Paradigm: Encoding Concepts
  - A Unified Paradigm: Encoding Transformations
  - Unified Paradigm: Example Systems
  - A Unified Paradigm: Complex Systems
  - A Unified Paradigm: Color Interchange
  - A Unified Paradigm: Implementation
  - Closing Thoughts and Conclusions
- Appendices
  - Colorimetry
  - Densitometry
  - Photographic Media
  - Adaptation
  - Viewing Flare
  - Scene-Based Color Encoding Specifications
  - Transformations for Color Interchange
  - Color-Primary Conversions

DIGITAL COLOR MANAGEMENT
Encoding Solutions
Second Edition

Edward J. Giorgianni
Thomas E. Madden

WILEY

- • Mathematical Transforms
- • Glossary
- • Suggested Reading
- • Index

GREY, Tim
2004. Color Confidence: The Digital Photographer's Guide to Color Management. Sybex.

We now have this book. It looks excellent. A different style than by more traditional color scientists (whose work is a tad stiff for us photographers). This book discusses profiling a scanner and how to profile your monitor. In the chapter on print output, the coverage is basic (a polite way of saying that it is not a dedicated monograph on color management for printers). But at least the publisher, Sybex, is honest to hint that the book is mainly about digital photography color, and not about printer color management.

252 pages. Has a brief glossary and an index.

GREY, Tim
2005. Color Confidence: The Digital Photographer's Guide to Color Management

Contents:
- ▪ Introduction
- ▪ **Chapter 1 Foundations**
- ▪ The Nature of Light
- ▪ Light in Photography
- ▪ The Nature of Color
- ▪ Perceived Color
- ▪ The Color Wheel
- ▪ Color Models
- ▪ Metamerism
- ▪ Color Profiles
- ▪ Rendering Intents
- ▪ Introducing Color Management
- ▪ Limitations of Color Management

- ▪ **Chapter 2 Photoshop Setup**
- ▪ Color Settings
- ▪ Settings Dropdown
- ▪ More Options
- ▪ Working Spaces
- ▪ Color Management Policies
- ▪ Conversion Options
- ▪ Advanced Controls
- ▪ Saving and Loading Color Settings
- ▪ Warnings
- ▪ Gamut Warning Preferences
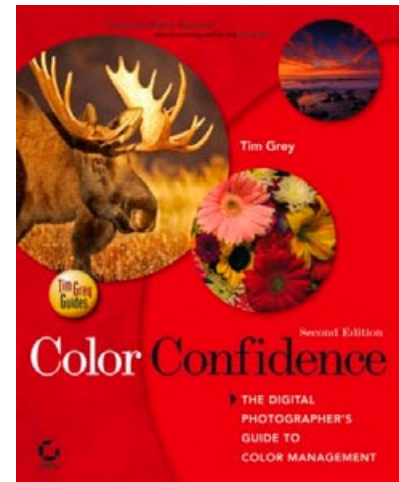
- Embedded Profile Mismatch
- Paste Profile Mismatch
- Missing Profile
- Embedded Profile Mismatch Alert
- Assigning and Converting Profiles
- Assign Profile
- Convert to Profile

- **Chapter 3 Display**
- Choosing a Monitor
- Monitor Adjustments
- Brightness
- Resolution
- Contrast Ratio
- Pixel Pitch
- Pixel Response Time
- Display Size
- Viewing Angle
- Special Concerns
- Choosing a Display Adapter
- Calibrating and Profiling Your Monitor
- Target Values
- Preparing to Profile
- Tools for Calibrating and Characterizing
- Evaluation
- Frequency
- Display Conditions
- **Chapter 4 Scanning**
- Choosing a Scanner
- Flatbed versus Film Scanner
- Resolution
- Dynamic Range
- Bit-Depth
- Software Issues
- Approaches to Scanning
- Information Method
- Accuracy Method
- Scanner Profiles
- MonacoEZcolor
- GretagMacbeth Eye-One Photo
- Assigning a Scanner Profile
- Evaluating Scans

- **Chapter 5 Digital Capture**
- Digital Cameras
- Features to Look For
- Basic Camera Settings
- Managing Digital Camera Color

- White Balance Presets
- Custom White Balance
- Custom Camera Profiles
- Automating Profile Assignments in Photoshop
- RAW Capture and Conversion
- Working Space Issues
- Tagged Images
- Untagged Images

- **Chapter 6 Optimization**
- Evaluating Images
- Memory Colors
- Saturation Testing
- Making Color Adjustments
- Color Balance
- Color Balance with Levels
- Color Balance with Curves
- Neutral by the Numbers
- Selective Color
- Hue/Saturation
- Targeted Adjustments
- Color-Adjusting Black-and-White Images
- Convert with Channel Mixer
- Colorize for Print
- Saving the File
- File Formats
- Embedded Profiles

- **Chapter 7 Output**
- Choosing a Printer
- Printer Profiles
- Building Custom Printer Profiles
- Using "Canned" Printer Profiles
- Using Generic Profiles
- Choosing a Rendering Intent
- Preparing Images
- Soft Proofing
- Gamut Warning
- Adjusting Images
- Print Preparation
- Print Setup
- Print with Preview
- Printer Properties
- Printing with a RIP
- QuadTone RIP
- ImagePrint
- Evaluating Prints
- Environment
- Standard Print Target
- When Prints Don't Match

- CMYK Output
- RGB with Proof Print
- Converting to CMYK
- Web, E-mail, and Digital Slideshows
- Flatten the Image
- Resize the Image
- Convert to sRGB
- Save the Image
- Digital Projector Profiling

- **Chapter 8 Workflow**
- Predictable Output
- The Pre-Workflow Checklist
- Process-Specific Workflows
- Scan-to-Print Workflow
- Digital Capture to Print Workflow
- Web, E-mail, and Digital Projection Workflow
- CMYK Output Workflow

- **Glossary**
- Index

GREEN, Phil
1999. Understanding Digital Color. GATFPress.

400 pages

GretagMacbeth
2002. ColorCookbook. Free download in PDF format from www.i1color.com (eyeOne abbreviated i1).

Comes along with free animated training manuals.

Contents:
- The Eye-One Color Cookbook
  - Device dependence
  - Device independence
  - Device color space
  - Device profile
  - Profile connection space
  - Device link profile
  - Modular color space conversion
  - Asymmetric color space conversion
  - Printer rendering intents
  - Black point compensation
  - Comparing measured colors
  - Recommended soft-proofing settings

- Eye-One ICC Scanner Profiles
  - Profiling color positive materials
  - Profiling non-ICC scanning systems
- Eye-One ICC Monitor Profiles
  - The RGB viewing space
  - The RGB working space
  - On-screen color consistency
  - Scanner space and RGB working space
  - The monitor-size RGB working space
  - The all-purpose RGB working space
  - Mac OS monitor profiles
  - Matching black and white points
- Adobe Photoshop 6.0.1
  - Linking to the monitor profile
  - One-step soft-proofing
- Adobe Photoshop 5.5
  - Linking to the monitor profile
  - Two-step soft-proofing
- Adobe InDesign 1.5.2
  - Linking to the monitor profile
  - Two-step soft-proofing
  - File formats for soft-proofing
- Adobe Illustrator 9.0.2
  - Linking to the monitor profile
  - Soft-proofing limitations
- Adobe Acrobat 5.0
  - Linking to the monitor profile
  - Soft-proofing limitations

HINKEL Brad.
2007. Color Management in Digital Photography: Ten Easy Steps to True Colors in Photoshop.
Rocky Nook.

Contents:
- Ten Steps for Color Management
- Choose a Color Space
- Get a Good Monitor
- Create a Good Work Environment
- Calibrate and Profile Your Monitor
- Get a Good Printer
- Create Basic Prints
- Test Your Color Management System
- Create Advanced Prints
- Obtain Profiles
- Adjusting Colors for Advanced Printing
- What is Color Management?
- Select a Color Space
- What is a Color Space?
- Color Space Options
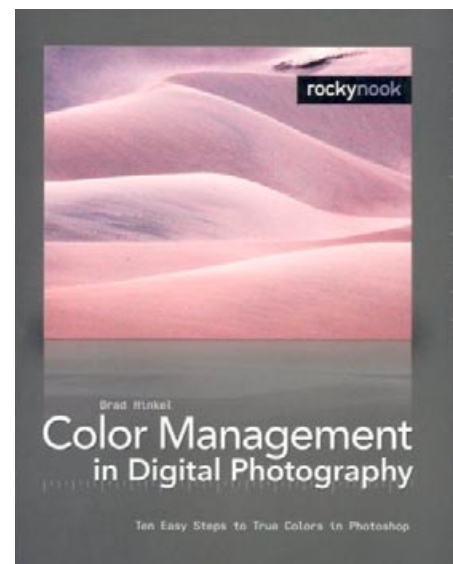
- sRGB
- Adobe RGB
- sRGB vs. Adobe RGB
- Some Other Color Spaces
- ColorMatch RGB
- ProPhoto RGB
- eciRGB
- scRGB
- Configuring Your Color Space
- Convert to sRGB
- Get a Good Monitor
- Selecting a Monitor
- Some Specific Monitor Recommendations
- Laptop Displays
- Video Cards
- Create a Good Work Environment
- The Effect of Environment on Color
- The Environment Matters
- Room Lighting
- Use a Monitor Hood
- Set Your Computer's Desktop to Boring Gray
- Remove Distracting Colors from Your Environment
- Proofing Light
- Profile Your Monitor
- Tools for Monitor Calibration and Profiling
- Monaco OPTIX & Monaco EZcolor
- Gretag MacBeth Eye-One
- ColorEyes Display
- Calibration
- Profiling
- Get a Good Printer
- Categories of Printer Choices
- Inexpensive Photo Printers
- Printing Online with a Photo Lab
- HP Photosmart Printers
- Epson UltraChrome Printers
- Epson K3 Printers
- Basic Printing
- Main Elements of Good Printing
- Using the Printer Driver
- Use the Printer as it was Designed
- A look at the Printer Driver
- Basic Printing
- Mac Print Dialog
- Windows Print Dialog
- Online Printing Services
- A Color Management Workflow
- A Basic Workflow
- Capture using your Working Color Space

- Converting RAW Files
- Opening Your Images in Photoshop
- Identifying the Color Space of Images in Photoshop
- Convert to sRGB
- Printing Options from within Photoshop
- Test Your Color System
- The Color Test Image
- Visual Evaluation
- Compare a Printed Test Image to the Monitor
- Compare the Printed Test Image to a Print You Make
- Advanced Printing
- Outline for Advanced Printing
- Setup the Soft Proof
- Resolving Changes to Colors due to the Soft Proof
- Printing with Profiles
- Mac Print Dialog
- Windows Print Dialog
- On Rendering Intents
- The Basic Problem - Gamut Mapping
- Gamut Compression
- Gamut Clipping
- The Rendering Intents
- Perceptual Rendering Intent (Photographic)
- Relative Colorimetric Rendering Intent (Graphic)
- The Other Rendering Intents
- Obtaining Profiles
- Manufacturer's Profiles
- Custom Profiles
- Making your Own Printer Profiles
- Installing Profiles
- Profile Names
- Adjusting Your Color for Printing
- Soft Proofing
- Fixing Color Shifts
- Paper Color
- Color Cast in the Profile
- Resolving Out-of-Gamut Colors
- Inspection
- Change Rendering Intent
- Reduce Saturation
- Color Mapping with Change Color
- Index

HOMANN, Jan-Peter
2009. Digital Color Management. Springer Verlag, Germany.

This English translation of this book has been stalled for almost two years. Evidently available in German original, 2000, Digitales Colormanagement. Farbe in der Publishing-Praxis. Macintosh- und Windows-Version. Possibly finally published as of June 2003 but we have not yet seen a copy ourselves.

Contents:
- Color Theory with Ideal Colors
- Color Theory with Realistic Colors
- The Principles of Color Management
- ISO 12647/GRACoL/SWOP for Separation, Proof and Print
- Using ICC Strengths and Avoiding ICC Problems
- PDF/X-1a and DeviceLink Color Servers
- Corner Stones for a Color-Management Strategy
- Acknowledgements

HSIEN, Che Lee
2005. Introduction to Color Imaging Science. Cambridge University Press

Contents:

- Preface
- Introduction
- Light
- Radiometry
- Photometry
- Light-matter interaction
- Colorimetry
- Light sources
- Scene physics
- Optical image formation
- Lens aberrations and image irradiance
- Eye optics
- From retina to brain
- Visual psychophysics
- Color order systems
- Color measurement
- Device calibration
- Tone reproduction
- Color reproduction
- Color image acquisition
- Color image display
- Image quality
- Basic concepts in color image processing
- Extended tables.
- Glossary
- Bibliography
- Index

JOHNSON, A. J.
1998. Guidelines for Choosing the Correct Viewing Conditions for Colour Publishing 2nd edition
        Pira International

We have been unable to locate a copy of this book. It is no longer listed in the Pira web site.

KELLY, Kenneth L, and **Deane B. JUDD**
1955. The ISCC-NBS Method of Designating Colors and a Dictionary
        of Color Names. National Bureau of Standards Circular 553,
        U.S. Dept. of Commerce, Washington, D.C.

KORNERUP, A and **J. H. WANSCHER**
1967. Methuen Handbook of Colour. Second edition. Methuen Co.,
        London. 243 pp and 30 two page color plates

252 Pages
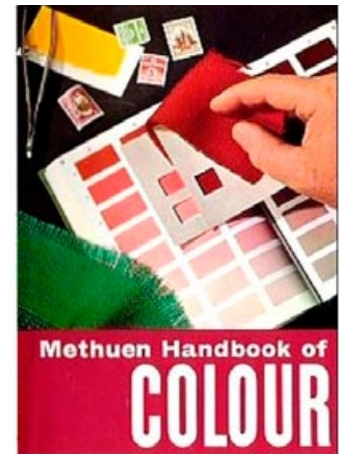
Monaco by X-Rite: Complete Guide to Color Management
2005. Complete Guide to Color Management. X-Rite Photo Marketing, Elmsford, New York. 44 pp.

The publication was written by the marketing department of X-Rite in an attempt to spark concerns about color management towards potential customers. Elsewhere it is not realistic to expect a company to give you unbiased information about color management. However, if you can get past the premise, you'll find that the first 18 pages of the book give a very informational, general education about the need for color management. The second half of the book is a catalog-like commercial for X-Rite and Monaco products. The last section of this book contains a very useful glossary of general color management terms. See FLAAR Glossary of Color Management Terms.

Contents:
- Color Management overview
- What is the problem-color doesn't match?
- Why is there a problem? Devices are different
- Making it work- Calibration and Profiles
- Taking it step by step
- For advanced users
- Practical solutions
- Tips and Tricks
- Glossary
- Soft Proofing guide

MUNSELL, Alfred H.
1976. Munsell Book of Colors. Various editions; various titles over the years.

In the early 1900's Munsell developed a system for color notation that used numbers instead of illogical names such as passionate petunia. His book of colors has been standard reference at least since the 1950's. As an archaeologist and art historian I used Munsell color charts for years, to provide color designations for the colors of pre-Columbian art and artifacts. Even today, in the computer era, the Munsell color charts are still valid. A brief but helpful commentary on the Munsell system is available from www.wikipedia.org/wiki/Munsell_color_system. Munsell's position in color science is perhaps best realized by the fact that the Rochester Image of Science named their prestigious lab the "Munsell Color Science Laboratory."

Munsell color charts are available today from GretagMacbeth.

NELSON, Phil.
2007. The Photographer's Guide to Color Management: Professional Techniques for Consistent
         Results. Amherst Media, Inc.

    Contents:
- Introduction
- The Challenges of Digital Photography
- Building a Digital Photography Workflow
- Why Color Management?
- The Color Problem
- The Extended Photography Workflow: Working with Clients and Service Providers
- Relying on Service Providers
- Working with Clients Who Don't Understand Color Management
- The Benefits of Color Management
- Predictable Color
- Reduced Waste of Media and Time
- Improved Communication with Members of the Extended Workflow
- Real World Expectations: The Colors Will Not Always Match!
- Certain Devices Cannot Perceive, Display, or Render All the Colors in Your Image
- Aspects of the Workspace Can Negatively Impact Color Perception
- Outside Services Cannot Always "Get It Right"
- The Objective of This Book
- Preview: A Color-Managed Workflow
- A Typical Workflow: No Color Management
- A Typical Color-Managed Workflow
- Color-Management Concepts
- RGB and CMYK Color Models
- RGB
- CMYK
- The Color Space and Color Gamut

- Device-Dependent Color Space
- Different Devices Define the Same Color Differently
- Device-Independent Color Space
- The Importance of Device-Independent Color
- Lab Color
- Profile Connection Spaces
- ICC Color Profiles
- Working Spaces
- Color-Management Methods
- Application-Level Color Management
- System-Level Color Management
- Assigning Color Meaning vs. Converting Color Data
- Assigning a Profile
- Converting to a Color Space
- Rendering Intents
- Relative Colorimetric
- Absolute Colorimetric
- Perceptual
- Saturation
- Embedding Profiles
- Software Setup
- Define a Standard Working Space and Source-to-Destination Conversions
- Where Do ICC Profiles Come From?
- Device Manufacturers, Application Developers, Paper Manufacturers
- Profile Services
- Build Your Own
- Where Do ICC Profiles Live?
- Macintosh
- Windows
- System-Level Color Management: Setting Up
  - Macintosh
  - Windows
  - Shortcomings of System-Level Color Management
  - Application-Level Color Management: Setting Up
  - Color Settings in Photoshop CS2
  - Setting Up Phase One Capture One Pro
  - Building a Color-Managed Workflow
  - What Is Needed?
  - Hardware for Setting Up Color Management
  - Software for Setting Up Color Management
  - Device Calibration vs. Profiling
  - Calibration
  - Display Calibration and Profiling
  - Types of Displays
  - Display Calibration
  - White Point
  - Gamma
  - Luminance

- Display Profiling
- Testing Your Calibration and Profile
- Creating Input Profiles
- Digital Cameras
- Raw Files
- Jpeg and Tiff Files
- Scanners
- Creating Output Profiles
- Inkjet Printer
- Building RGB and CMYK Output Profiles
- Media Type
- Walking Through the Color-Management Workflow
- Inputting Images
- The Digital Camera Workflow
- Raw Files
- Jpeg/Tiff Files
- The Scanning Workflow
- Outputting Images
- Graphic Design/Prepress
- Worldwide Web
- Inkjet Printer
- Outputting to a Rip
- Raw Converters that Print
- Common Pitfalls
- Redundant Conversion
- Printer Presets
- Assigning the Monitor's Profile
- Proofing
- Final Output Device (FOD) Profile
- Soft-Proofing
- Gamut Warning
- Hard-Proofing
- Rips that Proof
- The Work Environment
- ISO 3664
- Room Lighting
- Evaluating Prints
- Practical Appraisal
- Critical Color Matching
- The Color-Critical Workstation
- The Extended Workflow
- Working with Photo Labs
- Preparing Images for Clients
- Clarify the RGB Color Space
- Get an ICC Profile
- Web Images
- File Format
- Converting and Embedding
- Web References
- Index

O'QUINN, D.
2000. Print publishing: A Hayden shop manual. Indianapolis, Hayden Publishing.

800 Pages

REINHARD, Erik. KHAN, Erum. AKYUZ Ahmet and **JOHNSON Garret.**
2008.   Color Imaging: Fundamentals and Applications. A K Peters.

1074 Pages

Contents:
- Principals
- Introduction
- Physics of light
- Chemistry of matter
- Human Vision
- Perception
- Color Models
- Radiometry and Photometry
- Colorimetry
- Color Spaces
- Illuminants
- Chromatic Adaptation
- Color and Image Appearance Models
- Digital Color Imaging
- Image Capture
- High Dynamic Range Image Caption
- Display Technologies
- Image Properties and Image Display
- Color Management
- Dynamic Range Reduction
- Appendices
- Vectors and Matrices
- Trigonometry
- Complex Numbers
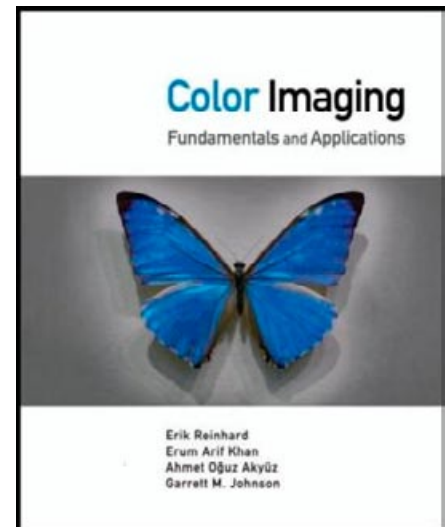
RIDGWAY, Robert
1912. Color Standards and Color Nomenclature. Washington, D.C., published by the author.
43 pp and 53 color pls.

Bibliographic information on Ridgway is from www.colorsystem.com Ridgway isthe epidomy of elabo-rate descriptive names for colors. It was probably excessively idiosyncratic naming systems such as this that Munsell reacted against with a more systematic numerical nomenclature. Considering that Ridgway was an ornithologist and lover of nature, he can perhaps be forgiven for his flowery names for colors such as Vinaceous Tawny. Ridgway colors were the standard in archaeological literature up to the 1930's. At least by the 1960's archaeologists had switched to the Munsell system for naming and referencing colors.

Contents:
- Preface
- Prologue
- Plan
- Color names
- Color Terms
- Table of percentages of component colors in spectrum hues
- Table of percentages of white and black in tone scales
- Table of percentages neutral gray in broken colors
- Table of percentages of black and white in tones of carbon gray
- Dyes and pigments used in coloring of Maxwell disks
- Alphabetical list of color represented on plates
- Colors of old edition not represented on plates
- List of useful books on color

RICH, Jim

2004. The Rip Report, Using And Choosing ICC-Based RIPs That Drive Inkjet Color Printers.

I contacted the author who politely responded within a few hours, saying that he was closing down his consulting company and switching to a regular job. He also said the book was no longer available.

RODNEY, Andrew

2005. Color Management for Photographers. Focal Press.

This is a good book by a well known and knowledgeable author. But, if you notice that the sub-title is "Hands on Techniques for Photoshop Users" then you may wonder beforehand whether this book is not really about color management, but instead about color manipulation in Adobe Photoshop. Color manipulation has absolutely nothing to do with color management and for sure not an iota of relationship with ICC color profiles. But once you open up the book you see that it really does cover color management and profiling. Indeed this does not delve into color manipulation (as expected from the emphasis on Photoshop in the sub-title).

464 pages, good paper, illustrations mostly in color. Glossary, index, bibliography is only of web sites but this is better than no bibliography at all. For some reason it is out of fashion to create a list of suggested reading. Perhaps publishers nowadays want not to list books of competing publishers.

Contents:
- Color management and why we need it
- Photoshop and color management
- Building display profiles
- Building scanner profiles
- Building camera profiles
- Building printer/output profiles
- Printing to a press
- CMS utilities
- Tutorials
- Case studies

SAFFIR, David
2006. Mastering Digital Color: A Photographer's and Artist's Guide
        to Controlling Color. Course Technology PTR

   Contents:
- Introduction: imagine the possibilities
- Getting a grip on your color : definitions and a road map
- Controlling your color: tools for photographers
- Production guide for photographers
- Color management policies for photographers
- Production guide for artists
- Color quality control
- Black and white imaging in the digital world
- Preserving color : archiving and storage
- Helpful tips and tricks
- Art gallery
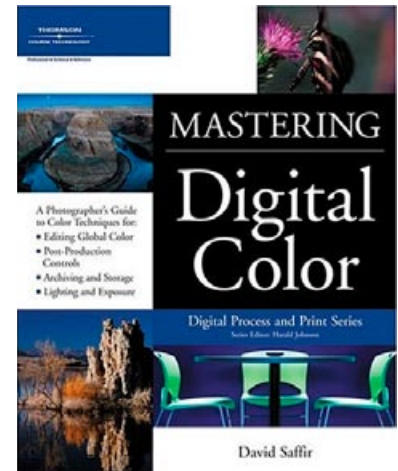
SHAFFER, Julie
2005. Color Management and PDF.

61 Pages

SHARMA, Abhay
2003. Understanding Color Management. Delmar Publishers.

   Contents:
- Introduction
- Color and Vision
- Color by Numbers
- Measuring Instruments
- Inside Profiles
- Scanner and Camera Profiles
- Monitor Profiles
- Press and Printer Profiles
- Apple Utilities
- Color Management in Photoshop
- Profile Quality
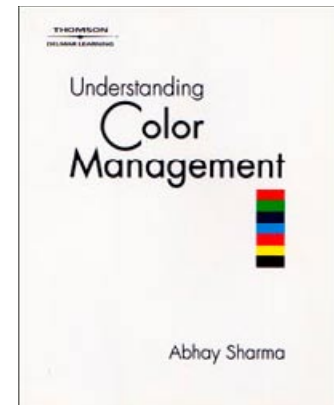
SHARMA, Gaurav
2002. Digital Color Imaging Handbook. CRC Press.

   Contents:
- Color fundamentals for digital imaging
- Visual psychophysics and color appearance

- Physical models for color prediction
- Color management for digital imaging systems
- Device characterization
- Digital color halftones
- Human visual model-based color halftoning
- Compression of color images
- Color quantization
- Gamut mapping
- Efficient color transformation implementation
- Color image processing for digital cameras

We found this book in the color reference library of BARBIERI electronic company headquarters in Brixen, Italy, during a factory and demo room visit, November 2008.
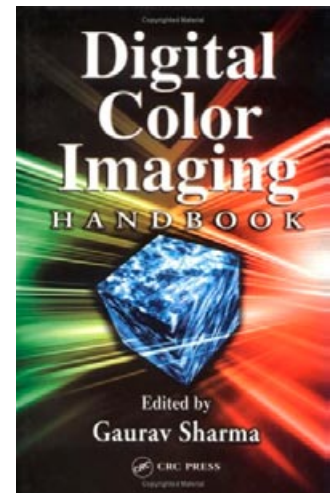
STEINMUELLER, Uwe and **Juergen GULBINS**
2008. Fine Art Printing for Photographers. 2nd edition. Rocky Nook, Santa Barbara, California

Uwe Steinmuller is a well known fine art photographer with a popular website, www.outbackphoto.com. Juergen Gulbins is described on the book jacket flap as a prolific writer and interested in photography. This book provides the reader with many years photography and printing experience of Uwe Steinmuller and his wife, Betinna. If you are interested in fine art inkjet printing you can learn a lot from this book. In other words, we recommend it. You can buy the books of Rocky Nook most places on the Internet. The books are distributed by O'Reilly Media.

The reason why I include this book in a bibliography on color management is because he has one chapter on this subject. The overall book per se, however, is on general aspects of inkjet printing as well as on tweaking your digital photographs before you even get ready to think about a printer.
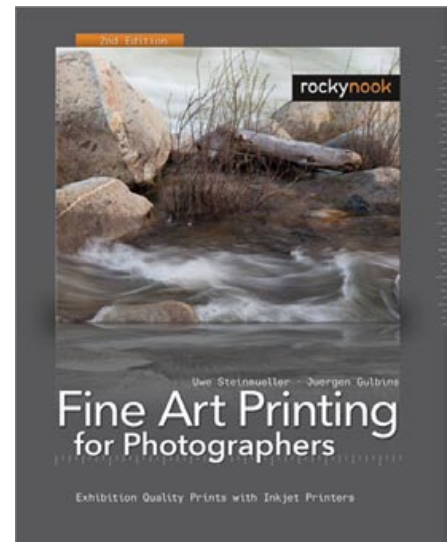
TAPP Eddie
2006. Color Management: Eddie Tapp on Digital Photography. O'Reilly Media

149 pages.

Contents:
- Introduction
- Chapter 1
- The search for consistent color
- A brief history of color management
- Color management today
- Chapter 2
- Understanding key color management concepts

- Calibration versus profiling device profiles
- Color space
- Rendering intents
- Chapter 3
- Establishing a color management–friendly workflow
- Input stage
- Process stage
- Output stage
- Bonus step: file archiving
- Chapter 4
- Three stages of color management
- Establishing a working color space
- Calibrate and profi le devices
- Convert to output profile
- Creating cm workflow actions
- Chapter 5
- Technically speaking
- Under the hood
- Profile editing
- Cm and scanning: in depth
- Raster image processors (rips)
- Hands-on monitor profiling
- Hands-on printer profiling
- Some final cm thoughts
- Appendix
- Additional color management resources
- Additional resources
- Index

TALLY, Taz and **Glenn MARTIN**
2001. Avoiding the Color Management Blues, Prentice Hall.

This book was announced in 2002, then delayed. The word on the street was the writer did not agree with the publisher. However, as of 2005, the book seems to be out (dated 2003). We searched for this publication and came across three websites that mentioned the book. Two of them listed that the book had been postponed and Amazon UK listed it as available. Whatever the case, be sure that you are buying the book from a legitimate company.

As of December 2008, the Canadian version of Amazon lists the book as "this title has not yet been released." The question is whether a book written in 2001 will be pertinent in 2009.

If you happen to be interested in scanner software, one book that Tally did actually finish is on Silver-Fast, which is the best after-market scanner software (from Germany).

YULE, John A., update chapter by Gary Field
2001. Principles of Color Reproduction. GATFPress, Pittsburgh.

Contents:
- Introduction
- Elementary Principles of Color

- Elementary Principles of Color Reproduction
- Masking Methods
- Tone Reproduction and Color Balance
- Spectral Sensitivities for Color Separation
- Inks and Papers
- Additivity and Proportionality of Densities
- Graphical Analysis of Color Correction
- Mathematical Analysis of Color Correction
- Four-Color Printing and the Black Printer
- Color Scanners
- Moire Patterns
- Appendix A: Tables
- Appendix B: Calculations of Tristimulus Values
- Appendix C: Calculations of Colorimetric Quality Factor
- Appendix D: Calculations of Selected Ordinates
- Appendix E: The Neugebauer Equations
- Appendix F: Construction and Use of Spectroscope
- References
- Index

WEISBERG, Joshua
2004. Apple Pro Training Series: Color Management in Mac OS X. Peachpit Press.

Contents:
- Color-Management Basics
- Using Color Management in Mac OS X
- Color Profile Basics
- Creating Custom Profiles
- Color Managing Images
- Image Proofing and Output
- Using the Adobe Common Color Architecture
- Managing Color in Page Layout
- Managing Color Proofs
- Color Server Workflows
- Internet and DV Color Management
- Apple's Digital Production Platform: An integrated Workflow
- Glossary

X-Rite
1998. The Color Guide and Glossary. X-Rite, Inc., Grandville, Michigan.

This booklet is free; we got ours from X-Rite, but due to the date of publication it may be out of print now. This is a glossary of color science; not a 'how to' booklet on color management. However it is worth getting a hold of so you can start to learn the terms. It is nicely illustrated.

Contents:
- Color Communications
- Understanding Color
- The CIE Color Systems
- Spectral Data vs. Tristimulus Data
- Color Management and Control
- Instrumentation
- Measurement in the Graphic Arts Workflow
- Color Specification
- Color Management
- Color Formulation
- Color Control
- Color Verification
- Glossary
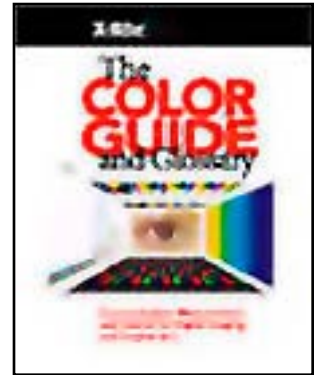
We found this PDF´S in the color reference library of BARBIERI electronic company headquarters in Brixen, Italy, during a factory and demo room visit, November 2008.

www.adobe.com/designcenter/creativesuite/articles/cs3ip_clrwrkflow.pdf

www.adobe.com/products/creativesuite/pdfs/cscolormgmt.pdf

www.onyxgfx.com/document.pl?cmd=download&docid=36

Issue Date

First issued about September 2003. Substantially updated during October 2003, adding all the references and bibliographies present in various individual FLAAR reports on color management. Those lists of references had grown to the point that we felt it more practical to list them all alphabetically in a single place. The impetus for this dedication to forming a comprehensive bibliography on color management was attending a 3-day program on color management where the list of suggested reading was helpful, but meager. Since we already had the lists of pertinent articles and web sites, we felt it would be useful to publish this information so everyone could have it. Updated April 2006 during a time that Paul Huhtula worked on general updates of the color management reports of FLAAR under the editorship of Nicholas Hellmuth. Updated again January 2007.

Updated December 2008 based on surveys of the literature of the last two years by the staff of FLAAR Mesoamerica (the Guatemalan office of FLAAR Reports which otherwise is in the US).

Most recently updated May 2009

To obtain information about color management hardware and software for North America (especially USA), about the advantages of BARBIERI electronic, contact.

Don Bobenhouse
e-mail: dbobenhouse@smartstuffinc.com
Office phone: 636-532-6131

SmartStuff is the master distributor for BARBIERI electronic in the USA. In the past SmartStuff was master distributor for Kodak CreoScitex scanners (the best flatbed scanner in the world).

FLAAR has visited the offices of SmartStuff (they are near the office FLAAR in St Louis, Missouri).
We know the company and the manager, Don Bobenhouse.

BARBIERI booth at Photokina 2008

BARBIERI booth at SGIA 2008

The author wishes to thank BARBIERI electronic Electronic company for sponsoring the publication of this bibliography on color management. In past years, in order to cover the costs of our publications on color management, we had to charge a fee for our color management downloads. Now, today, the bibliography and glossary are both free. By being free, several thousand people a month, all over the world, will download these FLAAR Reports.

Color management is important for FLAAR since we are an institute coming from a background of photography of art and artifacts. It is important that the original colors of these murals and painted vases be better reproduced in prints and publications. So our interest in color management stems from the need for reproducing accurate color in our own field. But the color management needed by museums, botanical gardens, and zoological research centers are the same color management workflow practices needed by photo labs, franchise sign shops, and major digital billboard printers around the world If you wish to learn color management check with the experienced people of BARBIERI.

BARBIERI electronic snc, Via Ignaz Seidner, 35 39042 Bressanone / Brixen - ITALY. Tel.: +39 0472 834 024, Fax: +39 0472 833 845 info@BARBIERIelectronic.com, www.BARBIERIelectronic.com

In past years BARBIERI spectrophotometers have been available primarily in Europe. Now there are places in the US, Canada, and Latin America where this professional color management equipment is available too. Please contact the master distributor, ImageTech LLC, www.ImageTechDigital.com, Mark Spandorf (owner and president), mark@imagetechdigital.com, or 510 238-8905

RIP, COLOR MANAGEMENT, and ICC Color Profiles options

Once you have a serious UV-curable wide-format printer, you may prefer to have an equally serious RIP software and color management equipment.

The RIP software for simple water-based printers such as Canon, Epson, and HP may not be the same RIP software that could be most effective and productive on a UV-curable flatbed or UV-cured roll-to-roll production printer.

I first noticed Caldera RIP on Gandinnovations UV printers several years ago, then I saw Caldera being used at the Mutoh Europe factory demo room in Belgium.

When I was visiting the Durst factories in Europe I again noticed that they were using Caldera RIP software.

So I requested access from Caldera so I could visit their world headquarters in Strasbourg, France, to spend several days learning more about their RIP. As a result there is now a FLAAR Report photo essay on this software.

Most recently I have seen Caldera RIP at the Shanghai printer trade show in China, at DRUPA in Germany, at FESPA Digital in Geneva, SGIA '08 and Viscom Italy '08.

When I visited a large printshop in Maribor, northern Slovenia, they were using Caldera RIP and the manager of technical services for this company said, *"Caldera does a good job."* This company in Slovenia has about eight UV printers (about five of them from Durst) and an equal number of large solvent printers. They originally used a GretagMacbeth color man-

agement system but switched to BARBIERI because the BARBIERI spectrophotometer can read more efficiently and can handle textiles, backlit, wood and other materials that are either awkward or difficult on other brands of color management instruments. You can learn about the BARBIERI equipment either from their headquarters in Brixen or their distributors worldwide.

Caldera also offers a highly regarded spectrophotometer from Barbieri, the leading color management company in Italy (they are headquartered in the same city as Durst, the manufacturer of Rho UV-cured printers).
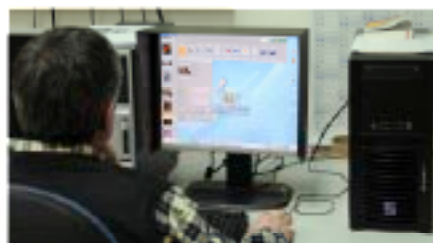
For further information on Caldera contact Joseph MERGUI
mergui@caldera.fr
If you have questions about color management, if you are in the US you can contact: ImageTech at:
www.ImageTechDigital.com
Mark Spandorf (owner and president),
mark@imagetechdigital.com
or 510 238-8905.
If you are in Europe or the rest of the world you can contact **BARBIERI** directly at: BARBIERI electronic snc,
info@BARBIERIelectronic.com
www.BARBIERIelectronic.com
Tel.: +39 0472 834 024
Fax: +39 0472 833 845

As soon as you have your UV-flatbed printer, your printshop will desire to have a cutter or trimmer.

First you need to trim. Simple cutting of the edges of your board so the edges are neat and clean. Then of course some clients will ask if you can do contour-cutting. This means you can offer additional services and earn additional income.

The best way to learn about trimmers is to ask a distributor who has more than one brand. This way they do not push their house brand and denigate brands that they do not carry. Also, you want a real person that actually has experience. Otherwise you get a "box push-er" who is simply an Internet sales person, who does not know trimmer from dimmer.

The person we suggest is Mike Lind because his company, Reprographic Designs, han-dles all leading brands: KeenCut, Neolt, Meteor Metoschnitt, RotaTrim, etc. You can con-tact him at 1 281 492 2714 or malind@msn.com.

His company is also the Master Distributor for Cruse reprographic scanners in the US and adjacent countries.

We have seen Gerber cutters at work during major trade shows, both in Europe and in the US. Gerber has dealers all across the US and Canada, and in Europe is served by Spandex.

XY Cutter Options

In a period of economic recession printshops will tend to ask about options that are priced lower than high-end prices. Thus we suggest a possible solution at mid-range price: Gerber M class cutters. I have inspected two huge factory complexes of Gerber Scientific in 2008 (especially their cutters for fabrics) and will be visiting their facilities again in 2009.

To contact Gerber:
Phone (US): 800-222-7446, email: cservice@gspinc.com
Fax: 800-227-6228 or 860-648-8064
Phone (Int'l): 860-648-8028, email: gspinternational@gspinc.com

When you acquire a UV-curable wide-format printer you will eventually learn that an XY flatbed cutter is a useful accessory for thick rigid materials. The advantage of having an XY cutter is that you are selling not just the print, but a finished work. To stay ahead of the competing printshops in your city it helps to offer your clients a solution for every step of the printing workflow.

Dr. Hellmuth shows a sample processed by the Gerber M Series cutter exhibited at GraphExpo '08.

Gerber M Series cutter at ISA '08.

Reality Check

Being a university professor for many years does not mean we know everything. But intellectual curiosity often leads us to enter areas that are new to us. So we do not shirk from entering areas where we are obviously not yet expert. If in your years of wide format printing experience have encountered results different that ours, please let us know at ReaderService@FLAAR.org. We do not mind eating crow, though so far it is primarily a different philosophy we practice, because since we are not dependent on sales commissions we can openly list the glitches and defects of those printers that have an occasional problem.

FLAAR and most universities have corporate sponsors but FLAAR web sites do not accept advertising, so we don't have to kowtow to resellers or manufacturers. We respect their experience and opinion, but we prefer to utilize our own common sense, our in-house experiences, the results from site-visit case studies, and comments from the more than 53,000 of our many readers who have shared their experiences with us via e-mail (the Survey Forms).

Licensing Information

If you wish to distribute this report to other people within your company, please obtain a site licensing agreement for multiple copies from FLAAR by contacting ReaderService@FLAAR.org Substantial discounts are available for licensing to distribute within your company; we call this a subscription. The advantage of a subscription license is that you can opt for automatic updates. You may have noticed that FLAAR reports tend to be updated as additional information becomes available.

In some instances a license would be available to distribute outside your company, including in other languages.

To distribute this report without subscription/license violates federal copyright law. To avoid such violations for you, and your company, you can easily order additional copies from www.wide-format-printers.NET.

Update Policy

Starting in 2008, updates on UV-curable wide-format inkjet printers are available for all individuals and companies which have a subscription, or to companies who are research project sponsors. If you are a Subscriber or manager in a company that is a research sponsor, you can obtain the next update by writing ReaderService@FLAAR.org. If you are neither a Subscriber or a research sponsor, simply order the newest version via the e-commerce system on www.wide-format-printers.NET. Please realize that because we have so many publications and many are updated so frequently that we have no realistic way to notify any reader of when just one particular report is actually updated.

There is a free PDF that describes the UV-curable inkjet printer Subscription system. Subscriptions are available only for UV-related wide-format printer publications.

FLAAR Reports on UV-curable roll-to-roll, flatbed, hybrid, and combo printers are updated when new information is available. We tend to update the reports on new printers, on printers that readers ask about the most, and on printers where access is facilitated (such as factory visits, demo-room visits, etc).

Reports on obsolete printers, discontinued printers, or printers that not enough people ask about, tend not to be updated.

FLAAR still publishes individual reports on solvent printers, and on giclee printers, but subscriptions on these are not yet available; these FLAAR Reports on solvent, eco-solvent, and water-based wide format printers have to be purchased one by one.

Please Note

This report has not been licensed to any printer manufacturer, distributor, dealer, sales rep, RIP company, media, or ink company to distribute. So, if you obtained this from any company, you have a pirated copy.

If you have received a translation, this translation is not authorized unless posted on a FLAAR web site, and may be in violation of copyright (plus if we have not approved the translation it may make claims that were not our intention).

Also, since this report is frequently updated, if you got your version from somewhere else, it may be an obsolete edition. FLAAR reports are being updated all year long, and our comment on that product may have been revised positively or negatively as we learned more about the product from end users.

If you receive any FLAAR Report from a sales rep, in addition to being violation of copyright, it is useful to know if there is a more recent version on the FLAAR web site, because every month new UV printers are being launched. So what was good technology one month, may be replaced by a much better printer elsewhere the next month.

To obtain a legitimate copy, which you know is the complete report with nothing erased or changed, and hence a report with all the original description of pros and cons, please obtain your original and full report straight from www.FLAAR.org.

Your only assurance that you have a complete and authentic evaluation which describes all aspects of the product under consideration, benefits as well as deficiencies, is to obtain these reports directly from FLAAR, via www.wide-format-printers.NET.

Citing and Crediting

A license from FLAAR is required to use any material whatsoever from our reports in any commercial advertisement or PR Release.

If you intend to quote any portion of a FLAAR review in a PowerPoint presentation, if this is in reference to any product that your company sells or promotes, then it would be appropriate to ask us first. FLAAR reports are being updated every month sometimes, and our comment on that product may have been revised as we learned more about the product from end users. Also, we noticed that one company cited the single favorable comment we made on one nice aspect of their printer, but neglected to cite the rest of the review which pointed out the features of the printer which did not do so well. For them to correct this error after the fact is rather embarrassing. So it is safer to ask-before-you-quote a FLAAR review on your product.

The material in this report is not only copyright, it is also based on years of research. Therefore if you cite or quote a pertinent section, please provide a proper credit, which would be minimally "Nicholas Hellmuth, year, www.FLAAR.org." If the quote is more than a few words then academic tradition would expect that a footnote or entry in your bibliography would reference the complete title. Publisher would be www.FLAAR.org.

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or otherwise notify us in advance. FLAAR reports are being updated every week sometimes, and our comment on that product may have been revised as we learned more about the product from end users. Also, we noticed that one company cited the single favorable comment we made on one nice aspect of their printer, but neglected to cite the rest of the review which pointed out the features of the printer which did not do so well. For them to correct this error after the fact is rather embarrassing. So it is safer to ask-before-you-quote a FLAAR review on your product.

Legal notice

Inclusion in this study by itself in no way endorses any printer, media, ink, RIP or other digital imaging hardware or software. Equally, exclusion from this study in no way is intended to discredit any printer.

Advisory

We do our best to obtain information which we consider reliable. But with hundreds of makes and models of printers, and sometimes when information about them is sparse, or conflicting, we can only work with what we have available. Thus you should be sure to rely also on your own research, especially asking around. Find another trustworthy end-user of the same make and model you need to know about. Do not make a decision solely on the basis of a FLAAR report because your situation may be totally different than ours. Or we may not have known about, and hence not written about, one aspect or another which is crucial before you reach your decision.

The sources and resources we may list are those we happen to have read. There may be other web pages or resources that we missed. For those pages we do list, we have no realistic way to verify the veracity of all their content. Use your own common sense plus a grain of salt for those pages which are really just PR releases or outright ads.

We are quite content with the majority of the specific printers, RIPs, media, and inks we have in the FLAAR facilities. We would obviously never ask for hardware, software, or consumables that we knew in advance would not be good. However even for us, a product which looks good at a trade show, sounds good in the ad literature, and works fine for the first few weeks, may subsequently turn out to be a lemon.

Or the product may indeed have a glitch but one that is so benign for us, or maybe we have long ago gotten used to it and have a workaround. And not all glitches manifest themselves in all situations, so our evaluator may not have been sufficiently affected that he or she made an issue of any particular situation. Yet such a glitch that we don't emphasize may turn out to be adverse for your different or special application needs.

Equally often, what at first might be blamed on a bad product, often turns out to be a need of more operator experience and training. More often than not, after learning more about the product it becomes possible to produce what it was intended to produce. For this reason it is crucial for the FLAAR team and their university colleagues to interact with the manufacturer's training center and technicians, so we know more about a hardware or software. Our evaluations go through a process of acquiring documentation from a wide range of resources and these naturally include the manufacturer itself. Obviously we take their viewpoints with a grain of salt but often we learn tips that are worthy of being passed along.

FLAAR has no way of testing 400+ specifications of any printer, much less the over 101 different UV printers from more than 46 manufacturers. Same with hundreds of solvent printers and dozens of water-based printers. We observe as best we can, but we cannot take each printer apart to inspect each feature. And for UV printers, these are too expensive to move into our own facilities for long-range testing, so we do as best as is possible under the circumstances. And when a deficiency does become apparent, usually from word-of-mouth or from an end-user, it may take time to get this written up and issued in a new release.

Another reason why it is essential for you to ask other printshop owners and printer operators about how Brand X and Y function in the real world is that issues may exist but it may take months for these issues to be well enough known for us to know the details. Although often we know of the issues early, and work to get this information into the PDFs, access to information varies depending on brand and model. Plus with over 300 publications, the waiting time to update a specific report may be several months. Plus, once a printer is considered obsolete, it is not realistic to update it due to the costs involved.

For these reasons, every FLAAR Report tries to have its publication date on the front outside cover (if we updated everything instantly the cost would be at commercial rates and it would not be possible to cover these expenses). At the end of most FLAAR Reports there is additionally a list of how many times that report has been updated. A report with lots of updates means that we are updating that subject based on availability of new information. If there is no update that is a pretty good indication that report has not been updated! With 101 models of UV printers, several hundred solvent printers, and scores of water-based printers, we tend to give priority to getting new reports out on printers about which not much info at all is available elsewhere. So we are pretty good about reporting on advances in LED curing. But glitches in a common water-based printer will take longer to work its way through our system into an update, especially if the glitch occurs only in certain circumstances, for example, on one type of media. With several hundred media types, we may not yet have utilized the problem media. While on the subject of doing your own research, be sure to ask both the printer operator and printshop owner or manager: you will generally get two slightly different stories. A printer operator may be aware of more glitches of the printer than the owner.

But even when we like a product and recommend it, we still can't guarantee or certify any make or model nor its profitability in use because we don't know the conditions under which a printer system might be utilized in someone else's facility. For ink and media, especially after-market third-party ink and media, it is essential that you test it first, under your conditions. We have no way to assure that any ink or media will be acceptable for your specific needs in your specific print shop. As a result, products are described "as is" and without warranties as to performance or merchantability, or of fitness for a particular purpose. Any such statements in our reports or on our web sites or in discussions do not constitute warranties and shall not be relied on by the buyer in deciding whether to purchase and/or use products we discuss because of the diversity of conditions, materials and/or equipment under which these products may be used. Thus please recognize that no warranty of fitness or profitability for a particular purpose is offered.

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent,

eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Our reports are on usability, not on health hazards.

Most inks are clearly not intended to be consumed. Obviously these tend to be solvent inks and UV-curable inks. Yet other inks are edible, seriously, they are printed on birthday cakes. Indeed Sensient is a leader in a new era of edible inks. Therefore the user must assume the entire risk of ascertaining information on the chemical contents and flammability regulations relative to inks, media or laminates as well as using any described hardware, software, accessory, service, technique or products.

We have no idea of your client's expectations. What students on our campus will accept may not be the same as your Fortune 500 clients. In many cases we have not ourselves used the products but are basing our discussion on having seen them at a trade show, during visiting a print shop, or having been informed about a product via e-mail or other communication.

Results you see at trade shows may not be realistic

Be aware that trade show results may not be realistic. Trade shows are idealized situations, with full-time tech support to keep things running. The images at a trade show may be tweaked. Other images make be "faked" in the sense of slyly putting on primer without telling the people who inspect the prints. Most UV inks don't stick to all materials; many materials need to be treated.

Or the UV prints may be top-coated so that you can't do a realistic scratch test.

Booth personnel have many standard tricks that they use to make their output look gorgeous. In about half the cases you will not likely obtain these results in real life: in most cases they are printing uni-directional, which may be twice as slow as bi-directional.

Trade show examples tend to be on the absolutely best media. When you attempt to save money and use economy media you will quickly notice that you do not get anywhere near the same results as you saw in the manufacturer's trade show booth, or pictured in their glossy advertisement. Five years ago we noticed Epson was laminating prints to show glossy output because their pigmented inks could not print on actual glossy media. The same equipment, inks, media, and software may not work as well in your facility as we, or you, see it at a trade show. All the more reason to test before you buy; and keep testing before you make your final payment. Your ultimate protection is to use a gold American Express credit card so you can have leverage when you ask for your money back if the product fails.

Images printed at trade show may be in uni-directional mode: so you may not realize the printer has bi-directional (curing) banding defects until you unpack it in your printshop. Bi-directional curing banding is also known as the lawnmower effect. Many printers have this defect; sometimes certain modes can get rid of it, but are so slow that they are not productive.

You absolutely need to do print samples with your own images and the kind provided by your clients. Do not rely on the stock photos provided by the printer, ink, media, or RIP manufacturer or reseller. They may be using special images which they know in advance will look fabulous on their printer. Equally well, if you send your sample

images to the dealer, don't be surprised if they come back looking awful. That is because many dealers won't make a serious effort to tweak their machine for your kind of image. They may use fast speed just to get the job done (this will result in low quality). Check with other people in your area, or in the same kind of print business that you do. Don't rely on references from the reseller or manufacturer (you will get their pet locations which may be unrealistically gushy): find someone on your own.

Factors influencing output

Heat, humidity, static, dust, experience level of your workers (whether they are new or have prior years experience): these are all factors that will differ in your place of business as compared with test results or demo room results.

Actually you may have people with even more experience than we do, since we deliberately use students to approximate newbies. FLAAR is devoted to assisting newcomers learn about digital imaging hardware and software. This is why Nicholas Hellmuth is considered the "Johnny Appleseed" of wide format inkjet printers.

Therefore this report does not warranty any product for any quality, performance or fitness for any specific task, since we do not know the situation in which you intend to use the hardware or software. Nor is there any warranty or guarantee that the output of these products will produce salable goods, since we do not know what kind of ink or media you intend to use, nor the needs of your clients. A further reason that no one can realistically speak for all aspects of any one hardware or software is that each of these products may require additional hardware or software to reach its full potential.

For example, you will most likely need a color management system which implies color measurement tools and software. To handle ICC color profiles, you may need ICC color profile generation software and a spectrophotometer since often the stock pre-packaged ICC color profiles which come with the ink, media, printers and/or RIPs may not work in your situation. Not all RIPs handle color management equally, or may work better for some printer-ink-media combinations than for others.

Be aware that some RIPs can only accept ICC color profiles: you quickly find out the hard way that you can't tweak these profiles nor generate new ones. So be sure to get a RIP which can handle all aspects of color management. Many RIPs come in different levels. You may buy one level and be disappointed that the RIP won't do everything. That's because those features you may be lacking are available only in the next level higher of that RIP, often at considerable extra cost. Same thing in the progression of Chevy through Pontiac to Cadillac, or the new Suburbans. A Chevy Suburban simply does not have all the bells and whistles of the Cadillac Escalade version of this SUV.

Don't blame us... besides, that's why we are warning you. This is why we have a Survey Form, so we can learn when you find products that are inadequate. We let the manufacturers know when end users complain about their products so that the manufacturers can resolve the situation when they next redesign the system.

Most newer printer models tend to overcome deficiencies of earlier models. It is possible that our comparative comments point out a glitch in a particular printer that has been taken care of through an improvement in firmware or even an entirely new printer model. So if we point out a deficiency in a particular printer brand, the model you may buy may not exhibit this headache, or your kind of printing may not trigger the problem. Or you may find a work-around.

Just remember that every machine has quirks, even the ones we like. It is possible that the particular kind of images, resolution, inks, media, or other factors in your facility are sufficiently different than in ours that a printer which works just fine for us may be totally unsatisfactory for you and your clients. However it may be that the specific kind of printing you need to do may never occasion that shortcoming. Or, it may be that your printer was manufactured on a Monday and has defects that are atypical, show up more in the kind of media you use which we may not use as often or at all during our evaluations. Equally possibly a printer that was a disaster for someone else may work flawlessly for you and be a real money maker for your company.

So if we inspect a printer in a printshop (a site-visit case study), and that owner/operator is content with their printer and we mention this; don't expect that you will automatically get the same results in your own printshop.

In some cases a product may work better on a Macintosh than on a PC. RIP software may function well with one operating system yet have bugs and crash on the same platform but with a different operating system. Thus be sure to test a printer under your own specific work conditions before you buy.

And if a printer, RIP, media, or ink does not function, return it with no ands, ifs or buts. Your best defense is to show an advertising claim that the printer simply can't achieve. Such advertising claims are in violation of federal regulations, and the printer companies know they are liable for misleading the public.

But before you make a federal case, just be sure that many of the issues are not user error or unfamiliarity. It may be that training or an additional accessory can make the printer do what you need it to accomplish. Of course if the printer ads did not warn you that you had to purchase the additional pricey accessory, that is a whole other issue. Our reviews do not cover accessories since they are endless, as is the range of training, or lack thereof, among users.

The major causes of printer breakdown and failure is lack of maintenance, poor maintenance, spotty maintenance, or trying to jerry-rig some part of the printer. The equally common cause of printer breakdown is improper use, generally due from lack of training or experience. Another factor is whether you utilize your printer all day every day. Most solvent and UV printers work best if used frequently. If you are not going to use your printer for two or three days, you have to put flush into the system and prepare it for hibernation (even if for only four or five days). Then you have to flush the ink system all over again.

Also realize that the surface of inkjet prints are fragile and generally require lamination to survive much usage. Lamination comes in many kinds, and it is worth finding a reliable lamination company and receiving training on their products.

Also realize that no hybrid or combo UV printer can feed all kinds of rigid materials precisely. Some materials feed well; others feed poorly; others will skew.

Although we have found several makes and models to work very well in our facilities, how well they work in your facilities may also depend on your local dealer. Some dealers are excellent; others just sell you a box and can't provide much service after the sale. Indeed some low-bid Internet sales sources may have no technical backup whatsoever. If you pay low-bid price, you can't realistically expect special maintenance services or tech support later on from any other dealer (they will tell you to return to where you paid for the product). This is why we make an effort to find out which dealers are recommendable.

Obviously there are many other dealers who are also good, but we do not always know them. To protect yourself further, always pay with a level of credit card which allows you to refuse payment if you have end up with a lemon. A Gold American Express card allows you to refuse payment even months after the sale. This card may also extend your warranty agreement in some cases (check first).

Most of the readers of the FLAAR Reports look to see what printers we use in our own facilities. Readers realize that we will have selected the printers that we like based on years of experience and research. Indeed we have met people at trade shows who told us they use the FLAAR web site reports as the shopping list for their corporate purchases.

Yes, it is rather self-evident that we would never ask a manufacturer to send a product which we knew in advance from our studies was no good. But there are a few other printers which are great but we simply do not have them in our facilities yet.

So if a printer is not made available by its manufacturer, then there is no way we can afford to have all these makes and models in our facility. Thus to learn about models which we do not feature, be sure to ask around in other print shops, with IT people in other corporations, at your local university or community college. Go to trade shows..... but don't use only the booth...ask questions of people in the elevator, in line at the restaurant, anywhere to escape the smothering hype you get in the booth.

Realize that a FLAAR Report on a printer is not by itself a recommendation of that printer. In your local temperature, in your local humidity, with the dust that is in your local air, with your local operator, and with disorientation of the insides of a printer during rough shipment and installation, we have no knowledge of what conditions you will face in your own printshop. We tend to inspect a printer first in the manufacturing plant demo room: no disjointed parts from any shipment since this printer has not been lifed by cranes and run over a rough pot-holed highway or kept in smeltering heat or freezing cold during shipment.

Taking into consideration we do not know the conditions in which you may be using your hardware, software, or consumables, neither the author nor FLAAR nor either university is liable for liability, loss or damage caused either directly or indirectly by the suggestions in this report nor by hardware, software, or techniques described herein because.

Availability of spare parts may be a significant issue

Chinese printers tend to switch suppliers for spare parts every month or so. So getting spare parts for a Chinese printer will be a challenge even if the distributor or manufacturer actually respond to your e-mails at all. Fortunately some companies to have a fair record of response; Teckwin is one (based on a case of two problematical hybrid UV printers in Guatemala). The distributor said that Teckwin sent a second printer at their own expense and sent tech support personnel at their expense also. But unfortunately both the hybrid UV printers are still abandoned in the warehouse of the distributor; they were still there in January 2009. But Teckwin has the highest rating of any Chinese company for interest in quality control and realization that it is not good PR to abandon a client or reseller or distributor all together.

Recently we have heard many reports of issues of getting parts from manufacturers in other countries (not Asia). So just because you printer is made in an industrialized country, if you are in the US and the manufacturer is X-thousand kilometers or miles away, the wait may be many days, or weeks.

Lack of Tech Support Personnel Is Increasing

The book of sales in the third quarter of 2008 resulted in many tech support problems.

The recession resulted in even more: some manufacturers may need to skimp on quality control during a recession, or switch to cheaper parts suppliers. Plus they are not hiring enough tech support during a recession. So the bigger and more successful the company, in some cases the worse these particular problems may be.

Any new compiled printer may take a few months to break in.

Any new printer, no matter who the manufacturer, or how good is the engineering ane electronics, will tend to have teething issues. Until the firmware is updated, you may be a beta tester. This does not mean the printer should be avoided, just realize that you may have some downtime and a few headaches. Of course the worst case scenario for this was the half-million dollar Luscher JetPrint: so being "Made in Switzerland" was not much help.

Be realistic and aware that not all materials can be printed on equally well

Many materials don't feed well through hybrid (pinch roller on grit roller systems) or combo UV systems (with transport belts). Banding, both from poor feeding, and from bi-directional (lawnmower effect) are common on many UV-curable inkjet printers.

It is typical for some enthusiastic vendors to claim verbally that their printer can print on anything and everything. But once you unpack the printer and set it up, you find that it requires primer on some materials; on other materials it adheres for a few weeks but then falls off.

And on most hybrid and many combo printers, some heavy, thick, or smooth-surfaced materials skew badly. Since the claim that the printer will print on everything is usually verbal, it is tough to prove this aspect of misleading advertising to a jury.

Not all inks can print on all materials. And at a trade show, many of the materials you see so nicely printed on, the manufacturer may be adding a primer at night or early in the morning: before you see the machine printing on this material.

We feel that the pros and cons of each product speak more than adequately for themselves. Just position the ad claims on the left: put the actual performance results on the right. The unscrupulous hype for some printers is fairly evident rather quickly.

Be sure to check all FLAAR resources

Please realize that with over 200 different FLAAR Reports on UV printers, you need to be sure to check the more obscure ones too. If a printer has a printhead issue, the nitty gritty of this may be in the FLAAR Report on printheads. The report on the model is a general introduction; if we discussed the intimate details of printheads then some readers might fall asleep. And obviously do not limit yourself to the free reports. The technical details may be in the reports that have a price to them. Our readers have said they prefer to have the general basics, and to park the real technical material in other reports that people can buy if they really want that level of information.

So it may be best to ask for personal consulting. The details of the problems with the ColorSpan 5400uv series are rather complex: namely the center row of the Ricoh printheads. This would require an expensive graphic designer and consultants to show the details. And

the design of the printhead would probably be altered by the time we did any of this anyway. So it is essential to talk with people: with other end-users, and with FLAAR in person on a consulting basis.

one Epson). Yet we know other users who had better results; maybe ours came down the assembly line on a Monday or Friday afternoon, when workers were not attentive. One costly color management software package was judged "incapable" by two reviewers (one from the university; second was an outside user who had made the mistake of buying this package).

So it's obvious that providing products or even a grant is no shield from having your products fail a FLAAR evaluation. The reason is clear: the end user is our judge. The entire FLAAR service program is to assist the people who need to use digital imaging hardware and software. If a product functions we find out and promulgate the good news. If a product is a failure, or more likely, needs some improvement in the next generation, we let people know. If a product is hyped by what an informed user would recognize as potentially false and misleading nonsense, then we point out the pathetic discrepancies very clearly.

This is what you should expect from an institute which is headed by a professor.

Actually, most of our reviews are based on comments by end users. We use their tips to check out pros and cons of virtually every product we discuss. You can't fool a print shop owner whose printer simply fails to function as advertised. And equally, a sign shop owner who earns a million dollars a year from a single printer brand makes an impact on us as well. We have multiple owners of ColorSpan printers tell us that this printer is their real money earner for example. We know other print shops where their primarily income is from Encad printers. Kinkos has settled on the HP 5000 as its main money maker production machine, and so on.

Yet we have documentation of several print shop companies whose business was ruined by specific brands that failed repeatedly. It is noteworthy that it is always the same brand or printer at both locations: one due to banding and printheads then simply no longer printing one color; the other brand due to pokiness of the printer simply not being competitively fast enough. Same with RIPs, we have consistent statements of people using one RIP, and only realizing how weak it was when they tried another brand which they found substantially better. Thus we note that companies which experiment with more than one brand of product tend to realize more quickly which brand is best. This is where FLAAR is in an ideal situation: we have nine RIPs and 25 printers. Hence it is logical that we have figured out which are best for our situation.

Grant funding, sponsorship, demonstration equipment, and training are supplied from all sides of the spectrum of printer equipment and software engineering companies. Thus, there is no incentive to favor one faction over another. We receive support from three manufacturers of thermal printheads (Canon, ColorSpan and HP) and also have multiple printers from three manufacturers of piezo printers (Epson, Mutoh, and Mimaki). This is because piezo has definite advantage for some applications; thermal printheads have advantages in different applications. Our reviews have universal appeal precisely because we feature all competing printhead technologies. Every printer, RIPs, inks, or media we have reviewed have good points in addition to weaknesses. Both X-Rite and competitor GretagMacbeth provided spectrophotometers. Again, when all sides assist this program there is no incentive to favor one by trashing the other. Printer manufacturer ad campaigns are their own worst enemy. If a printer did not make false and misleading claims, then we would have nothing to fill our reviews with refuting the utter nonsense that is foisted on the buying public.

It is not our fault if some printers are more user friendly, print on more media than other brands. It is not our fault that the competing printers are ink guzzlers, are slow beyond belief, and tend to band or drop out colors all together. We don't need to be paid by the printer companies whose products work so nicely in both our universities on a daily basis. The printers which failed did so in front of our own eyes and in the print shops of people we check with. And actually we do try to find some redeeming feature in the slow, ink gulping brands: they do have a better dithering pattern; they can take thick media that absolutely won't feed through an HP. So we do work hard at finding the beneficial features even of printers are otherwise get the most critique from our readers. Over one million people will read the FLAAR Information Network in the next 12 months; 480,000 people will be exposed to our reports on wide format printers from combined total of our three sites on these themes. You can be assured that we hear plenty of comments from our readers about which printers function, and which printers fail to achieve what their advertising hype so loudly claims.

We turn down offers of funding every year. These offers come from PO Box enterprises or products with no clearly visible point of manufacture. Usually the company making the offer presumes they can buy advertising space just by paying money. But that is not what our readers want, so we politely do not accept such offers of money.

Contributions, grants, sponsorships, and funding for surveys, studies and research is, however, open to a company who has an accepted standing in the industry. It is helpful if the company has a visible presence at leading trade shows and can provide references from both end users and from within the industry. Where possible we prefer to visit the company in person or at least check them out at a trade show. Obviously the product needs to have a proven track record too. Competing companies are equally encouraged to support the FLAAR system. We feel that readers deserve to have access to competing information. Competition is the cornerstone of American individualism and technological advancement.

FLAAR also covers its costs of maintaining the immense system of 8 web sites in three languages and its facilities in part by serving as a consultant such as assisting inkjet manufacturers learn more about the pros and cons of their own printers as well as how to improve their next generation of printers. It is especially useful to all concerned when manufacturers learn of trends (what applications are popular and for what reasons). For example, manufacturers need to know whether to continue designing software for Mac users, or concentrate software for PC users. So the survey form that you fill out is helpful to gather statistics. You benefit from this in two ways: first, you get the FLAAR reports in exchange for your survey form. Second, your comments bring (hopefully) change and improvement in the next generation of printers. When we do survey statistics, then the names, addresses, and telephone numbers are removed completely. A survey wants only aggregate numbers, not individuals. However, if you ask about a specific brand of printer, and do not opt out, we forward your request to a pertinent sponsor so you can obtain follow-up from that brand, since we ourselves do not have enough personnel to respond to each reader by telephone. But we do not provide your personal information to outsiders and our survey form has an opt out check-off box which we honor.

FLAAR also serves as consultants to Fortune 500 companies as well as smaller companies and individuals who seek help on which printers to consider when they need digital imaging hardware and software.

A modest portion of our income comes from our readers who purchase the FLAAR series. All income helps continue our tradition of independent evaluations and reviews of inkjet printers, RIPs, media, and inks.