香港印刷業商會主辦
Organised by The Hong Kong Printers Association

ICC

色彩管理國際性研討會

Color Symposium

香港印刷、設計及出版業界盛事

November 13,2013

職業訓練局綜藝館
VTC Auditorium

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香港印刷業商會會長趙國柱先生 - 歡迎辭



香港印刷業商會會長趙國柱先生
Mr. Chiu Kwok Chu, Chairman of
The Hong Kong Printers Association

尊敬的麥靖宇署長、各位領導、各位嘉賓：

大家好！歡迎大家撥冗蒞臨由香港印刷業商會主辦的【ICC色彩管理國際性研討會】。首先，在此特別感謝香港特別行政區政府工業貿易署「中小企業發展支援基金」撥款資助，更承蒙香港特別行政區政府工業貿易署署長麥靖宇先生在百忙中蒞臨主禮，實在令是次研討會生色不少！

色彩管理對設計與印刷、甚至整個媒體供應鏈都十分重要。ICC，即國際色彩聯盟，是全球最權威的色彩聯盟組織，在制定顏色標準及發展方向上，扮演著領導角色。現時所有的軟件和硬件都以ICC色彩管理為骨幹，ICC規格在外國的印刷及設計行業標準上已被廣泛地使用，包括多個印刷國際標準及行業標準。有見印刷標準化高速發展，色彩管理是不可或缺的基礎，而懂得運用色彩管理及認識色彩管理的最新發展，不但可以提升產品的質素，更能改善印刷、設計及印刷買家之間的色彩溝通，以加強企業競爭力。

香港印刷業商會是香港最大及最具代表性的行業協會，一直肩負推動印刷業發展的使命。這個研討會是香港首次舉辦，與印刷及設計業從業員探討色彩管理的最新技術，以及在不同範疇實施色彩管理之竅門。今天，我們很榮幸邀請到多位ICC委員及其他海外頂尖的專家講解ICC色彩管理的最新趨勢，並分享在不同範疇的應用。在此，我要特別感謝各位海外嘉賓，遠道而來參加這次研討會。我相信這次研討會能為大家提供良好的交流平台，各位必定有所得著。

同時，我謹代表香港印刷業商會感謝多個機構的鼎力支持，包括承辦機構：印刷科技研究中心；協辦機構：ICC及香港知專設計學院；支持機構：精聯印刷有限公司、香港工業總會、香港印刷業工會、香港出版總會、印刷媒體專業人員協會及卓越培訓發展中心（印刷業）。

最後，我想藉此機會向籌備委員會致以最衷心的謝意，感謝眾委員在籌辦過程中出謀獻策。我現在宣佈研討會正式開始！祝願香港印刷業前途一片光明，各位有收獲豐富的一天！

Welcome Address From Mr. Chiu Kwok Chu, Chairman of The Hong Kong Printers Association

Dear Mr. Kenneth Mak,
distinguished leaders and guests,

Welcome to the ICC Color Symposium hosted by The Hong Kong Printers Association (HKPA). Our special thanks go to the Trade and Industry Department of Hong Kong SAR Government for sponsoring us with its SME Development Fund. I am particularly delighted by the presence of Mr. Kenneth Mak, Director-General of Trade and Industry of Hong Kong SAR Government to officiate at opening ceremony of ICC Color Symposium.

Color management is very important to design, printing and even the whole media supply chain. ICC, International Color Consortium, is the most trusted color-related organisation in the world and plays a leadership role in setting color standards and its development. Nowadays, all software and hardware are based on ICC Color Management. The ICC specifications and standards include various international and industrial printing standards, and it has been widely adopted by printing and design industries overseas. Given the rapid development of printing standardisation, color management should act as an essential base. If you understand how to apply color management and realise its latest development, you can enhance product quality, improve communication on colors among printing and design segments and increase your competitive edge as a buyer as well.

HKPA is the largest and most influential industry association in Hong Kong, aiming to develop the printing industry. This seminar, held for the first time in Hong Kong, discusses the latest technologies on color management with printing and design professionals and shares know-how on applying color management in various sectors. Today, we are honored to have invited many ICC members and international experts to share with us the latest trend of ICC color management and its different applications. My special thanks go to our international guests for coming a long way to this seminar. I believe it could act as a rewarding platform for us to exchange and learn.

On behalf of HKPA, I am also grateful to many organisations for their great support, including our Implementing Agent: Advanced Printing Technology Centre; our Co-organisers: ICC and Hong Kong Design Institute; and our Supporting Organisations: Ching Luen Printing Co. Ltd., Federation of Hong Kong Industries, Hong Kong Printing Industry Workers Union, Hong Kong Publishing Federation, Institute of Print-Media Professionals and Pro-Act Training and Development Centre (Printing).

Finally, I would like to express my deepest gratitude to members of the organising committee, who have offered great advices during the process. I wish Hong Kong's printing industry a bright future and to all of you a very informational day! Now let's begin the seminar!

印刷科技研究中心主席暨董事何家鏗先生 - 閉幕辭



印刷科技研究中心主席暨董事
何家鏗先生
Mr. Ho Kar Hun,
Chairman and Director of APTEC

各位主講嘉賓，同業好友，下午好！

是次研討會轉眼已到尾聲，過去數小時的分享中，相信大家已從各主講嘉賓，及從業界好友的交流中，獲得更多有關ICC色彩管理的最新趨勢和應用等資訊。

首先，我藉此機會，特別向所有主講嘉賓表示謝意。是次研討會得以成功，實在有賴你們鼎力支持與協助。七位主講嘉賓的演講均非常精彩，而論壇的討論更集各專家學者的智慧，內容充實。

這次研討會能夠順利舉行，實有賴各機構的支持和協助。此外，我要向各位出席的同業好友致衷心感謝，因為你們的參與令研討會生色不少，並做到集思廣益。

今次「ICC色彩管理國際性研討會」，由香港印刷業商會主辦，並由轄下印刷科技研究中心承辦，目的是協助業界提升色彩管理的新技術，增強競爭力。APTEC是商會轄下一所非盈利分配機構，一直與其他行業協會及機構緊密合作，協力為印刷業提供多元化專題活動。我們將會繼續藉著不同途徑，務求為業界提供最新的資訊和技術。

今天的研討會正好讓同業好友聚首一堂，共同交流意見和經驗。我在此呼籲各位繼續積極支持我們，共同提升香港印刷業的競爭優勢。謝謝！

Closing Remarks From Mr. Ho Kar Hun, Chairman and Director of APTEC

Dear speakers and friends,

Good afternoon! The seminar is coming to an end. I believe all of you have learned about the latest trend and applications of ICC color management in the last several hours from our speakers and friends in the industry.

Firstly, I specially thank all speakers for their great support and for bringing a success to this event. We have had marvellous speeches by our seven speakers and wisdom shared at the forum by our experts and scholars.

We also owe our success to the support of various organisations. We are grateful to our friends in the industry, who brainstormed the topic and added much splendour to the event.

The ICC Color Symposium is hosted by The Hong Kong Printers Association (HKPA) and implemented by its subordinate - Advanced Printing Technology Centre (APTEC), aiming to improve new technologies of color management for the industry and enhance competitiveness. APTEC is a non-profit organisation under HKPA. It has been cooperating closely with other industrial associations and organisations and helps to offer diverse featured events for the printing industry. We will continue to leverage different channels to offer the industry with latest information and technologies.

Today's event gathers our friends and offers us a platform for exchanging ideas and experience. I hope all of you may continue to support us and together increase competitiveness of Hong Kong's printing industry. Thank you!

鳴謝　Acknowledgement

主辦機構：
Organiser:

THE HONG KONG PRINTERS ASSOCIATION 香港印刷業商會

承辦機構：
Implementing Agent:

APTEC
印刷科技研究中心有限公司
Advanced Printing Technology Centre Ltd.
(A Subsidiary of The Hong Kong Printers Association)

協辦機構：
Co-organisers:

ICC

HONG KONG DESIGN INSTITUTE 香港知專設計學院

支持機構：
Supporting Organisations:

精聯印刷有限公司
Ching Luen Printing Co. Ltd.

香港工業總會 FHKI Federation of Hong Kong Industries

香港印刷業工會

香港出版總會有限公司
HONG KONG PUBLISHING FEDERATION LIMITED

IPP
INSTITUTE OF PRINT-MEDIA PROFESSIONALS
印刷媒體專業人員協會

PRO ACT Printing 印刷業

「中小企業發展支援基金」撥款資助
Funded by SME Development Fund

工業貿易署
Trade and Industry Department

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Any opinions, findings, conclusions or recommendations expressed in this material/event (or by members of the Project team) do not reflect the views of the Government of the Hong Kong Special Administrative Region, Trade and Industry Department or the Vetting Committee for the SME Development Fund and the Dedicated Fund on Branding, Upgrading and Domestic Sales (Organisation Support Programme)

ICC色彩管理國際性研討會 - 籌委會委員　ICC Color Symposium – Organising Committee Members

項目統籌人：

・馮文清先生（香港印刷業商會副會長）

副項目統籌人：

・彭安琪女士（印刷科技研究中心總監）

委員：

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・何家鏗先生（香港印刷業商會永遠名譽會長暨理事）
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・Mr. William Li（International Color Consortium 主席）

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• Mr. Peter Tse
  Vice-Chairman, The Hong Kong Printers Association

• Mr. Victor Tsang
  Executive Committee Member, Institute of Print-media
  Professionals

• Mr. William Li
  Co-Chair, International Color Consortium

ICC色彩管理國際性研討會程序

時間/Time	程序/Agenda
09：00am	**致歡迎辭** **Welcome address** • 趙國柱先生 香港印刷業商會會長 Mr. Chiu Kwok Chu, Chairman of The Hong Kong Printers Association **致送紀念品予嘉賓及所有講者** **Souvenir presentation to guests and all speakers** • 麥靖宇先生 香港特別行政區政府工業貿易署署長 Mr. Kenneth Mak, Director-General of Trade and Industry of HKSAR Government • 趙國柱先生 香港印刷業商會會長 Mr. Chiu Kwok Chu, Chairman of The Hong Kong Printers Association **嘉賓及所有講者合照** **Group photo with guests and all speakers**
09：20am	**ICC的介紹** **Overview of ICC** • Mr. William Li ICC 聯席主席/Kodak 色彩技術經理 Co-Chair, ICC/Color Technology Manager, Kodak
09：30am	**混合印刷及跨媒體的色彩流程** **Color workflow for hybrid printing & cross-media** • Mr. William Li ICC 聯席主席/Kodak 色彩技術經理 Co-Chair, ICC/Color Technology Manager, Kodak
10：00am	**印刷機特性測量與表現評估** **Minimize press profiling error by fingerprint and measurement of the press** • Mr. Ragy Isaac 高斯國際的品質總監 Quality Director, Goss International • Mr. John Seymour QuadTech首席工程師（研究） Principal Engineer Research, QuadTech
11：10am	小休 Tea Break
11：25am	**包裝色彩管理流程的挑戰** **Challenges in packaging color workflow** • Mr. Steve Smiley Smiley Color顧問/ISO TC130專家 Consultant, Smiley Color/ISO TC130 Expert

時間/Time	程序/Agenda
12：00pm	**論壇及答問時段** **Forum / Q & A** 主持人 Moderator: Prof. Brian Lawler 加利福尼亞州立大學圖像傳播副教授 Associate Professor, Graphic Communication, California Polytechnic State University 參與者 Participants: • Mr. William Li　• Mr. Ragy Isaac • Mr. John Seymour　• Mr. Steve Smiley
12：40pm	午膳 Lunch
02：00pm	**攝影流程的色彩管理應用** **Color management for photographic workflows** • Mr. Tom Lianza ICC聯席主席/X-Rite公司研發總監 Co-Chair, ICC/Director of R&D Imaging, X-Rite
02：35pm	**跨媒體的檔案處理及色彩管理** **Cross media process and color management** • Mr. Kin Wah Lam 出版技術顧問 Publishing Technology Consultant
03：10pm	小休 Tea Break
03：30pm	**ICC最新技術發展 - V.5** **New development of ICC – V.5** • Mr. Max Derhak ICC副主席/Onyx Graphics高級軟件工程師 Vice-Chair, ICC/Senior Software Engineer, Onyx Graphics
04：05pm	**論壇及答問時段** **Forum / Q & A** 主持人 Moderator: Prof. Brian Lawler 加利福尼亞州立大學圖像傳播副教授 Associate Professor, Graphic Communication, California Polytechnic State University 參與者 Participants: • Mr. Tom Lianza　• Mr. Kin Wah Lam • Mr. Max Derhak
04：45pm	**致閉幕辭** **Closing Remarks** • 何家鏗先生 印刷科技研究中心主席暨董事 Mr. Ho Kar Hun, Chairman and Director of APTEC

ICC的介紹
Overview of ICC

ICC的介紹



Mr. William Li
ICC 聯席主席/ Kodak 色彩技術經理
Co-Chair, ICC/ Color Technology Manager, Kodak

William目前是Eastman Kodak的色彩技術經理。Kodak正轉型為B2B公司，專注於商業影像業務。柯達將集中在商業、包裝和功能性印刷解決方案和企業服務，及為客戶提供了使他們具有競爭優勢的先進技術。William帶領團隊負責開發不同的核心色彩技術，例如柯達ColorFlow軟體、柯達打樣系統、Prosper以及Matchprint Virtual。

William在1997年開始他的印藝事業，他加入Creo屢獲殊榮的Prinergy PDF工作流程團隊，開發網點和校準軟體，並自2004年柯達收購Creo後，帶領色彩技術團隊。

他將工程、物理和系統設計的範疇引入印藝行業，成為企業工程部的一部份。William積極參與國際標準的制定工作，包括了ISO TC130和ICC，在ICC他擔任主席和曾擔任副主席。他經常在Printing Industries of America所舉辦的色彩管理會議、柯達印藝用家協會以及其他活動上擔任主講嘉賓。

William is currently Color Technology Manager with Eastman Kodak. Kodak is transforming into a B2B company focused on its Commercial Imaging business. Kodak will be centered on commercial, packaging and functional printing solutions and enterprise services, markets in which it offers customers advanced technologies that give them a competitive edge. William leads the team responsible for developing core color technology in such products as Kodak ColorFlow Software, Kodak Proofing System, Prosper, and Matchprint Virtual.

William began his career in the graphic arts industry in 1997, joining the award-winning Prinergy PDF workflow team developing screening and calibration software at Creo, and has led the color technology group since the 2004 acquisition of Creo by Kodak.

He brings a diverse background in engineering, physics, and systems design to the graphic arts as part of the Corporate Engineering Division. William is active in international standards work, including both ISO TC 130 as well as ICC, where he has served as Chair and Vice Chair of ICC. He has been a frequent speaker at the Printing Industries of America Color Management Conference, the Kodak Graphic Users' Association, and other venues.

International Color Consortium®

ICC Color Symposium

13/11/2013 · Hong Kong



Overview of ICC
ICC的介紹

William Li
Co-Chair, ICC
Color Technology Manager, Kodak

Organizer: The Hong Kong Printers Association 香港印刷業商會

Implementing Agent: APTEC 印刷科技研究中心有限公司 Advanced Printing Technology Centre Ltd. (A Subsidiary of The Hong Kong Printers Association)

Co-organizers: ICC; Hong Kong Design Institute 香港知專設計學院

International Color Consortium®

The International Color Consortium (ICC)

- An industry consortium 是一個國際協會
- Established in 1993 by eight industry vendors
  由八個行業供應商於1993成立



ICC Membership
ICC會員

- Founders 創辦者：

  Adobe Systems Incorporated
  Agfa-Gevaert N.V.
  Apple Computer, Inc.
  Eastman Kodak Company
  FOGRA-Institute (Honorary)
  Microsoft Corporation
  Silicon Graphics Inc.
  Sun Microsystems, Inc.
  Taligent, Inc.

The ICC Today
今日的ICC

- Today 58 members
  共有58個會員

- Goal: *Create, promote and encourage evolution of an open, vendor-neutral, crossplatform colour management system architecture and components*

目的：*創造、宣傳及鼓勵一個開放式、中立及跨平台的色彩管理的結構及組合*



International Color Consortium®

The ICC is truly international!
ICC真的國際化!!

- 23 member companies from the USA
- 17 member companies from Europe
- 18 member companies from Japan

- 23 會員公司來自美國
- 17 會員公司來自歐洲
- 18會員公司來自日本

There are currently no member companies from China or the rest of Asia!
現是沒有會員公司來自中國或其他亞洲國家!

International Color Consortium®

Benefits of ICC Membership
ICC會員的好處

- *Participation* in the on-going development of the ICC Profile Format Specification
- *Advanced notice* of future changes to the ICC Profile Format Specification
- *Networking* with world renowned color scientists
- *Recognition* of your company's support for the advancement of color management

- *參與*於ICC特性檔格式規格的持續發展
- *預先察覺*ICC特性檔格式規格的未來的修正
- 與世界知名的色彩科學家*聯繫*
- *認可*您公司對促進色彩管理的支持

Complete membership documents are available at www.color.org
詳細的會員資料可瀏覽 www.color.org

ICC Membership
ICC會員

- Founding members comprise the ICC Steering Committee together with an additional eight members.
- Currently approximately 58 members from all areas of the imaging and computer industry.

- 創會會員包括有ICC督導委員會以及其他八位會員
- 現時大約有58位會員來自圖像及電腦行業

The Heritage 歷史

- Several profile-like formats appeared in early 1990s
  - Kodak (Precision Transforms)
  - Apple (ColorSync)
  - EFI (EFI Color)
  - Adobe (PostScript CSA/CRD, PDF CalRGB)
- ICC's profile specification based on the Apple ColorSync profile format

- 幾個特性檔的雛形格式已於1990年代出現
  - Kodak (Precision Transforms)
  - Apple (ColorSync)
  - EFI (EFI Color)
  - Adobe (PostScript CSA/CRD, PDF CalRGB)
- ICC的特性檔規格是基於Apple ColorSync 特性檔格式

International Color Consortium®

ICC Support
ICC支援

ICC implementations:

- Operating system support on Apple, Microsoft, Sun, SGI, Java.
- Support for most high-end graphic arts and photography input and output devices.
- Support in most professional graphic arts and photography applications.
- Support for many high-end consumer devices.

ICC 執行：

- 在Apple, Microsoft, Sun, SGI, Java的操作系統上兼容
- 兼容最高端的印藝和攝影及輸出設備
- 兼容最專業的印藝和攝影軟件
- 兼容很多高端消費者的設備

International Color Consortium®

The ICC Profile
ICC特性檔

- ICC develops and promotes a standard colour profile specification (ICC Profile).
- The current version of the ICC profile specification is *ICC.1:2010-12 (Profile version 4.3.0.0) Image technology colour management - Architecture, profile format, and data structure* available as PDF at www.color.org
- Also published as ISO 15076-1

- ICC發展及宣傳一個標準色彩特性檔規格 (ICC特性檔)
- ICC特性檔規格現時版本是 *ICC.1:2010-12 (特性檔版本 4.3.0.0) 圖像技術色彩管理–結構、特性檔格、以及數據結構,* 可在www.color.org下載PDF檔
- 亦已出版為ISO 15076-1

Working Groups
工作小組

Working groups are investigating and working on recommendations and solutions for:

- Architecture
- Displays
- Graphic Arts Special Interest (GASIG)
- Profile Assessment
- Medical Imaging
- Specification Editing

工作小組是研究及為以下的項目提出建議及解決方案：

- 結構
- 螢光幕
- Graphic Arts Special Interest (GASIG)
- 特性檔評估
- 醫療圖像
- 規格修訂

Summary 結論

- The ICC has achieved its initial goal: a colour management architecture that allows for the communication of colour across devices, applications, and operating systems.
- In the future, the architecture will be broadened to fit additional colour workflows, and specifications tightened further to improve interoperability. This effort is being managed under the name ICCLabs

- ICC已達到初步的目的：一個色彩管理結構，容許不同設備、不同軟件及不同操作系統進行顏色溝通
- 將來，這結構將會擴大以適用於其他色彩管理工作流程，另外亦會將規格收緊以改善其共同操作性。此項工作名為ICCLabs。

混合印刷及跨媒體的色彩流程
Color workflow for hybrid printing and cross-media

International Color Consortium®

ICC Color Symposium

13/11/2013 · Hong Kong



Color Workflow for Hybrid Printing and Cross-Media
混合印刷及跨媒體的色彩流程

William Li
Color Technology Manager
Kodak

Organizer: The Hong Kong Printers Association 香港印刷業商會

Implementing Agent: APTEC 印刷科技研究中心有限公司 Advanced Printing Technology Centre Ltd.

Co-organizers: ICC; Hong Kong Design Institute 香港知專設計學院

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Color Translations
顏色的翻譯

Basic color management statement:

基本的色彩管理聲明:

"Make this look like that."

把這個製作得像那樣

Simple? Obvious?

簡單嗎? 明顯嗎？

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Color Workflow 色彩流程

*"Make **this** look like **that**."*

把這個製作得像那樣

3 Basic Challenges:

3 個基本的挑戰：

1. What are "this" and "that"? 什麼是"這"和"那"？

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Color Workflow 色彩流程

*"Make this **look like** that."*

把這個製作得像那樣

3 Basic Challenges:

3 個基本的挑戰：

1. What are "this" and "that"? 什麼是"這"和"那"？
2. What does "look like" mean? 像是什麼意思?

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Color Workflow 色彩流程

*"**Make** this look like that."*

把這個**製作**得像那樣

3 Basic Challenges:

3 個基本的挑戰：

1. What are "this" and "that"? 什麼是"這"和"那"？
2. What does "look like" mean? 像是什麼意思?
3. How do you "make" the color? 你如何製作顏色?

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Color Workflow 色彩流程

"Make this look like that."

把這個製作得像那樣

3 Basic Challenges:

3 個基本的挑戰：

1. What are "this" and "that"? 什麼是"這"和"那"？ — TARGET 目標
2. What does "look like" mean? 像是什麼意思? — RENDERING 渲染
3. How do you "make" the color? 你如何製作顏色? — WORKFLOW 工作流程

True for conventional, hybrid, pure digital, and cross-media (web) color workflows.
真實的傳統、混合、純數字化、跨媒體（網絡）的色彩工作流程。

ICC Color Management
ICC 色彩管理

- ICC profiles:
  - characterize a device printing condition.
  - specify some ways to render color to and from the device printing condition.
  - are used in a workflow to transform color.
- ICC profiles are used everywhere in graphic arts today, even when it's not obvious.

- ICC 特性檔：
  - 描述一個設備的印刷條件
  - 指定幾個方法由設備的印刷條件轉換顏色或將顏色轉換至設備的印刷條件
  - 用於工作流程中來轉換顏色
- ICC 特性檔在現今的圖形藝術中是無處不在地使用，即使不是很明顯

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First Steps 第一步

- Decide and communicate desired color target.
- ICC color management generally has a:
  - Source:
    - Color target you're simulating
  - Destination:
    - Device condition used to reproduce the source

- 決定和溝通所需的顏色目標
- ICC 色彩管理一般有：
  - 來源：
    - 所模擬的顏色目標
  - 目的地：
    - 用來重現來源的設備條件

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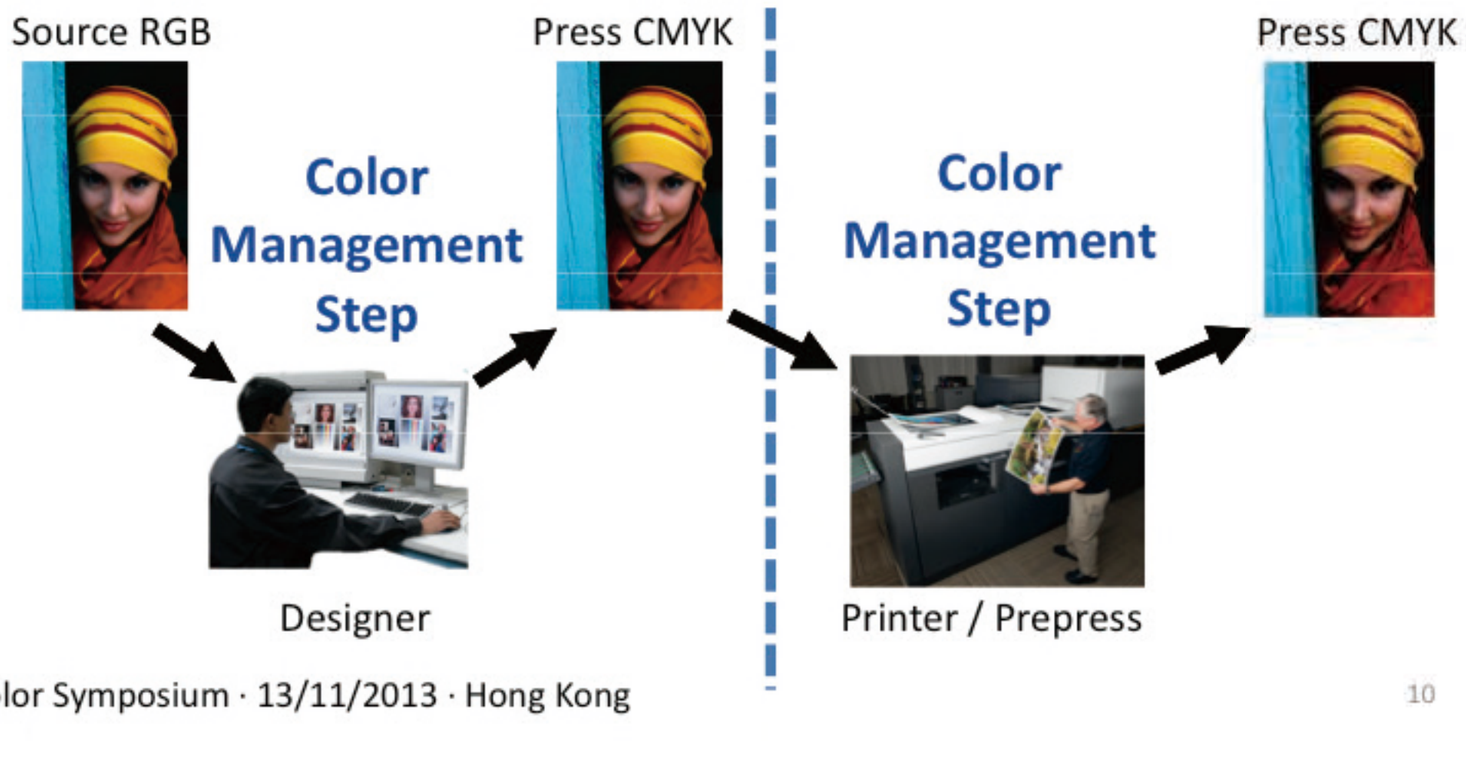
Early vs. Late Binding
早期與後期轉換

Early vs. late binding is about *when* and *who* does color conversion.

早期與後期轉換是指*何時*和*誰人*進行顏色轉換

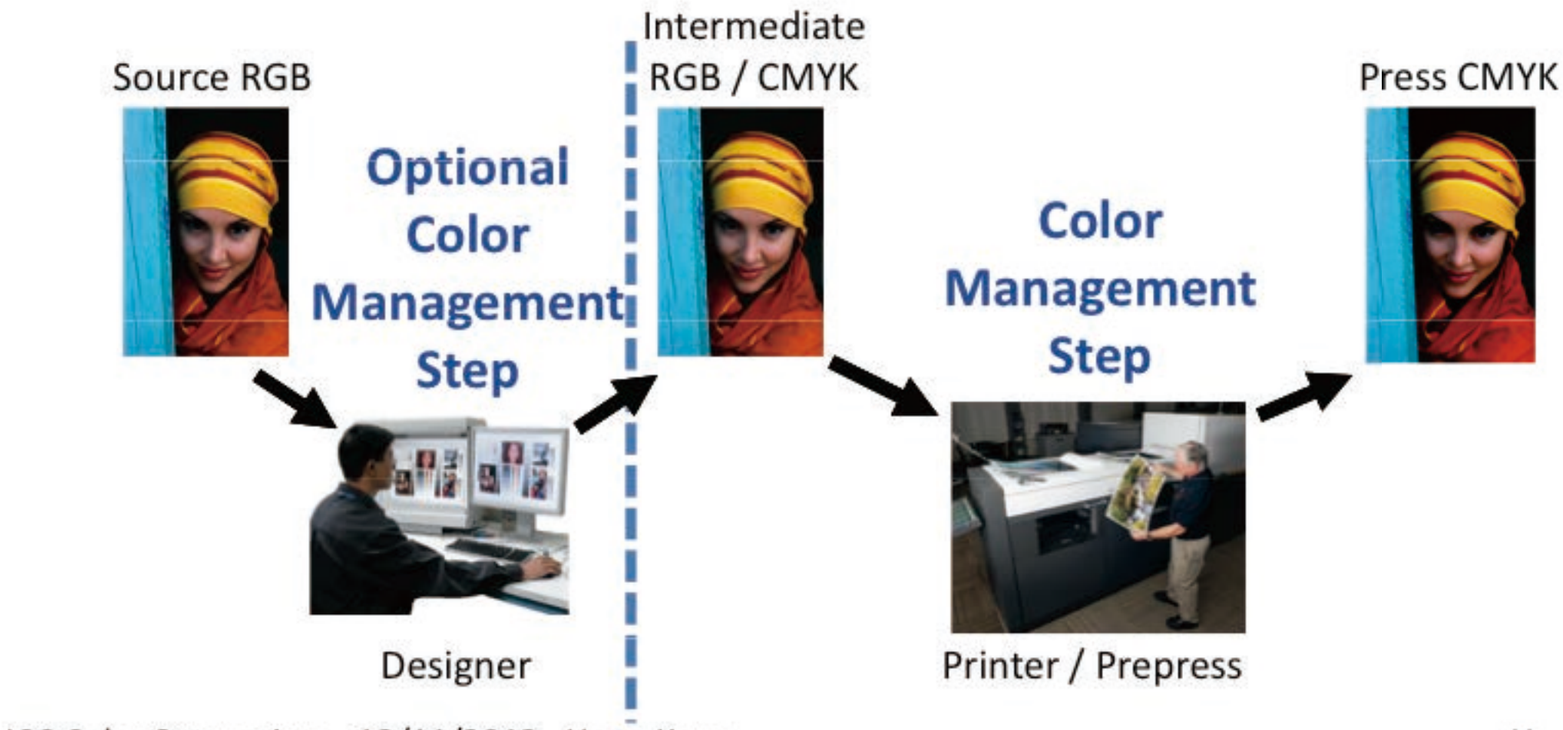
Early Binding Workflow 早期轉換流程

- In print world, usually means conversion by designer to final CMYK.
  在印刷世界中，通常是指由設計師轉換到最後的 CMYK



Late Binding Workflow 後期轉換流程

- In print world, usually means conversion by prepress or printer to final CMYK.
  在印刷世界中，通常是指由印前或印刷公司轉換到最後的 CMYK



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Early vs. Late Binding
早期與後期轉換

- Scale of operations will dictate early vs. late binding of color and shape of workflow.
  - Number of (different) print buyer customers
  - Ease of communicating with print buyers
- Early binding only if designers follow specifications.

- 作業規模將決定顏色是早期或後期轉換和工作流程的形式
  - （不同的）印刷買家的數量
  - 易於與印刷買家溝通
- 只有當設計師遵循規範時，使用早期轉換

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Choice of Color Target 顏色目標的選擇

- Use print standards as aims, but which ones?
  使用印刷標準作為目標，但哪個?
  - Printing process-based:
    基於印刷過程：
    - ISO 12647, ISO 2648, ISO 15311, GRACoL, SWOP
    - Process aims enough to set up printing. 處理程序目標足夠設置印刷
    - Not sufficient for color management. 不足以用於色彩管理
  - Gray balance:
    灰平衡：
    - IDEAlliance G7, ISO 10128
    - Color appearance (in neutrals) to set up printing. 以顏色外觀（中性）設置印刷
    - Limited ability to coordinate color; not really color management. 協調顏色的能力有限，不是真正的色彩管理
  - Characterization target-based:
    基於特性化目標：
    - ISO 15339, CGATS.21, GRACoL C1, SWOP, Fogra 39, etc.
    - Some work required to achieve directly on press. 有些工作需要在印刷機上直接完成
    - Reference print conditions for color management. 參考印刷條件進行色彩管理

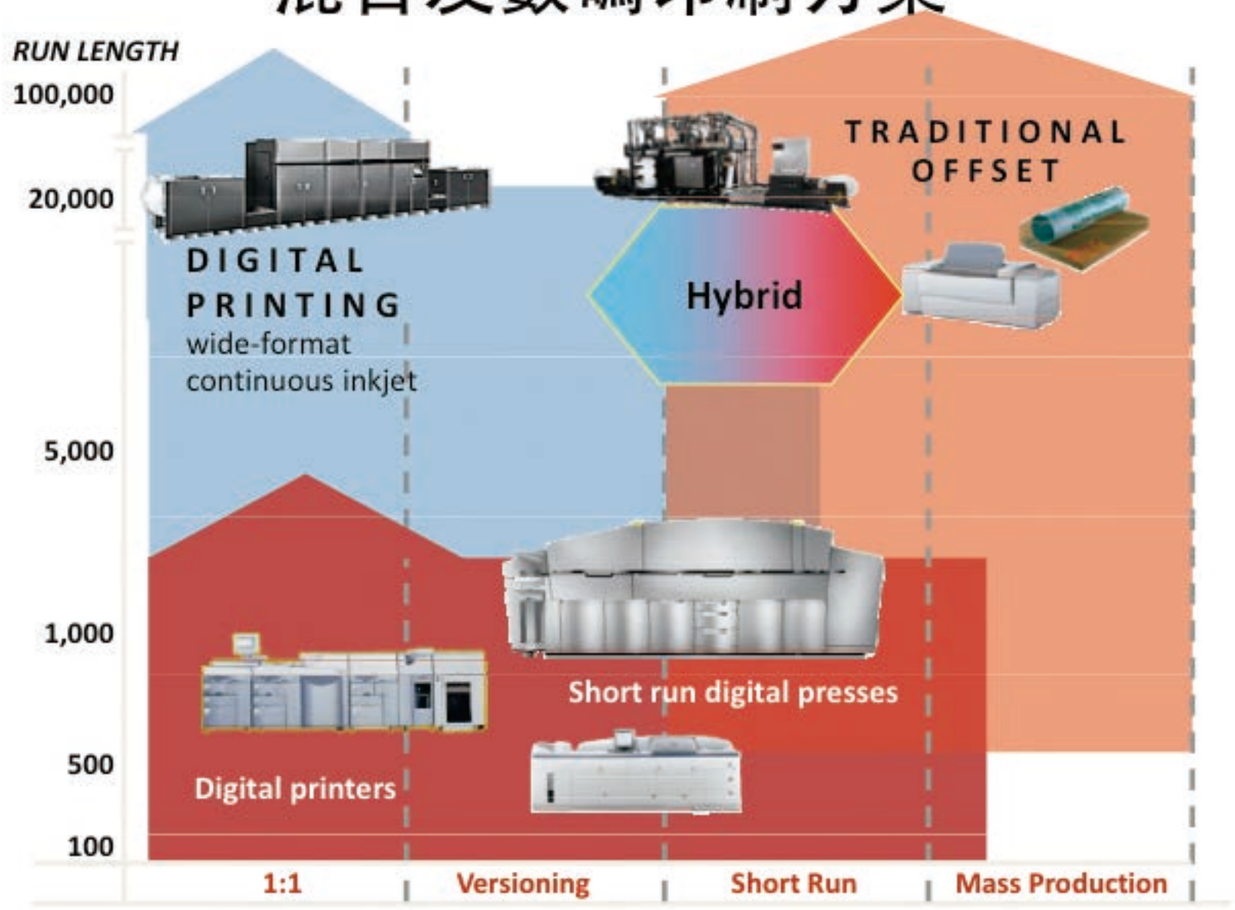
Other Target Choices...
其他目標的選擇 ...

- Proof-Referenced
  - Supplied proof for color matching
- Press simulating Standard as target
  - Create fingerprint of press after process control.
  - Use color management to hit target.
- Key points:
  - Choose and specify target first!
  - If making custom profiles, make and use right one.

- 參考打稿
  - 提供打稿作顏色匹配
- 印刷以模擬標準為目標
  - 在流程控制後，建立印刷機的指紋
  - 使用色彩管理達到目標
- 關鍵：
  - 先選擇與指定目標!
  - 如製作自定的特性檔，須製作和使用正確的

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Hybrid and Digital Print Solutions
混合及數碼印刷方案



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Types of Hybrid & Digital Printing
混合及數碼印刷的種類

Three major groupings:

三個主要類別:

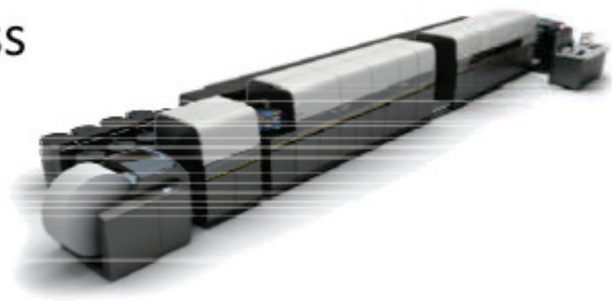


– Small digital printer in-house
內部的小型數碼印刷機

– Press-mounted digital unit
印刷機加上數碼部件



– Full-size dedicated digital press
全幅面的專用數碼印刷機





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Hybrid and Digital Print Color
混合及數碼印刷的顏色

Most people think of:
- Variable Data Print
- TransPromo (Transactional + Customer Relationship Management) printing
- Inline Printing

But what about:
- Split-run Printing
- Reprints
- Inserts

…(Almost) the same as conventional printing!

大多數人認為：
- 可變數據印刷
- TransPromo (交易 + 客戶關係管理) 印刷
- 連線印刷

但怎樣：
- 個別印刷
- 重印
- 插頁

…(幾乎) 與傳統印刷相同！



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Rendering Choices 顏色轉換的選擇

- 2 options for making “A” look like “B”:
  - Colorimetric
    - Good for side-by-side comparison
  - Appearance

- 2 個使 “A” 近似 “B”的選擇：
  - 色度法
    - 適合並排比較
  - 外觀

Rendering 顏色轉換

- **Re-Targeting** 重新設定目標
  - Change device but keep appearance, usually colorimetric (absolute or relative) rendering.
    更改設備但要保持外觀，通常使用色度法 (絕對或相對) 的顏色轉換
  - Typical situation: 典型的情況：
    - Receive CMYK file separated for GRACoL C1, re-separate to obtain same-looking output on digital press.
      重新分色所收到的以 GRACoL C1 分色的 CMYK 檔案，以達至在數碼印刷上得到相似的輸出

- **Re-Rendering** 重新轉換
  - Change color appearance, usually perceptual rendering.
    改變外觀顏色，通常使用感知性的轉換方式
  - Typical situation: 典型的情況：
    - Receive RGB digital image, render to output CMYK.
      接收 RGB 圖像檔案，轉換至用作 CMYK 輸出



Workflow 流程

... see Challenges

... 挑戰



Hybrid Workflow Challenges
混合流程的挑戰

- Hybrid color more critical if repeat-printing same subject or image both digital and conventional.
  - Suggestion: don't do this…
- Mixture of different RIPs can lead to color being handled differently.
  - Suggestion: don't do this… process all color through single central workflow as much as possible.

- 在混合流程中，顏色最為關鍵的是，需要在數碼及傳統印刷複製相同的主題或圖像
  - 建議：不這樣做 .....
- 混合使用不同的 RIP 可能會導致顏色得到不同的處理
  - 建議：不這樣做..... 所有顏色盡可能通過單一的中央工作流程來處理

And Workflow Again…
流程還有…

Variable Data Printing (VDP):

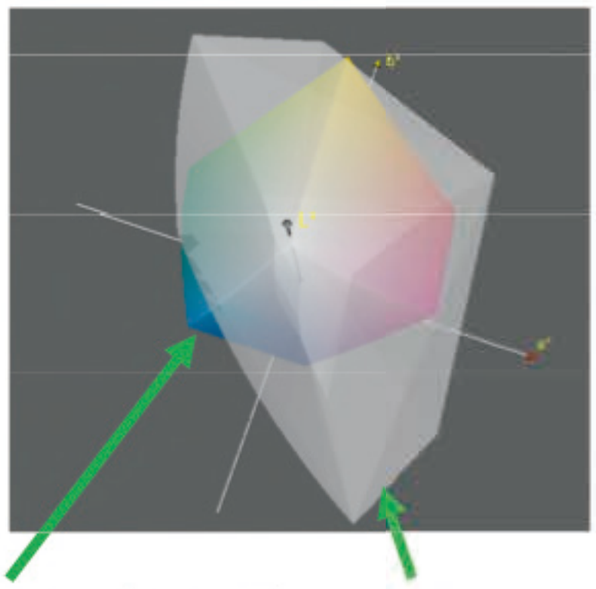
可變數據印刷：

- Most pieces have variable color elements independent of static content.
  大部分可變的色彩元素獨立於靜態內容
- Suggestion: early-binding on variable color elements
  建議：使用早期轉換於可變色彩元素



And What About Web Publication?
至於網上出版呢?

- Consider cross-media same way as for digital printing:
  跨媒體的考慮是與數碼印刷方式相同
  - Target :
    目標:
    - sRGB?
  - Rendering:
    顏色轉換:
    - Appearance match 外觀匹配
  - Workflow: 流程：
    - Various 各種類的



RPC-6 (GRACoL C1/Fogra 39)　　sRGB

Cross-Media Publication Issues
跨媒體出版的問題

- Limitations in available workflow software for handling color.
  - Assumptions in browsers, publication software.
  - Color gamuts of generally available monitors and tablets.
  - Uniformity of different display devices, all (not really) “sRGB”.
- ...plus all the structural content issues (text reflow, multimedia handling, etc).

- 現時用作顏色處理的工作流程軟件之限制
  - 假定在瀏覽器、出版軟件
  - 一般的顯示器和平板電腦的色域
  - 不同的顯示設備的一致性，所有都是 (不是真的) “sRGB”
- ...再加上所有內容的結構性問題（文本重排、多媒體處理等）



Test tools 測試工具

ICC-published HTML test for browser use of ICC profile color management:
ICC 發佈了HTML 測試，用作ICC 特性檔於瀏覽器的色彩管理：

http://color.org/version4html.xalter



Supports v4 ICC



Supports v2 ICC only



Does not support ICC

Key Points to Remember
要點

- Color management is built on top of solid process management, regardless of print type, paying attention to:
  - Target
  - Rendering
  - Workflow
- Hybrid color management means paying extra attention to where the color is flowing, with 2 or more devices producing primary color output, not just 1.
- Color-referred cross-media publication is still a work in progress for the industry as a whole – some hand-holding of the process is required.

- 色彩管理是建立於穩固的流程管理之上，不論印刷的種類，請留意：
  - 目標
  - 轉換方式
  - 工作流程
- 混合色彩管理意味著要格外注意顏色的流向，有 2 個或更多設備產生原色，不只是 1 個
- 為行業所發展的跨媒體出版的顏色參考之工作仍然在進行中 – 一些工序需要多加指導

印刷機特性測量與表現評估

Minimize press profiling error by fingerprint and measurement of the press



Mr. Ragy Isaac
高斯國際的品質總監
Quality Director, Goss International

Ragy Isaac是高斯國際的品質總監。他是工程師、統計學者及六式碼的培訓師。他在高斯工作的23年，他曾擔任發展科學家、高級科學家、高級工程師及品質總監。他在行業的經驗包括色彩科學、物料科學及數據分析。

Ragy 正擔任Technical Association of the Graphic Arts (TAGA)的司庫、the Metro Users Board of Directors的委員和SNAP的執委。Ragy自1975年已活躍於印藝行業，並曾榮獲四項發明印刷相關技術的專利。

Ragy Isaac is the Quality Director at Goss International. He is an engineer, a statistician and Six Sigma educator. During his 23 years with Goss, he served as Development Scientist, Senior Scientist, Senior Engineer and Quality Director. His industry experience includes color science, material science and data analysis.

Ragy is a Treasurer at the Technical Association of the Graphic Arts (TAGA), Executive member of the Metro Users Board of Directors and a SNAP Committee member. Isaac has been active in the graphic arts since 1975 and been awarded four patents for inventions in printing related technologies.

Minimize press profiling error by fingerprint and measurement of the press



Mr. John Seymour
QuadTech首席工程師（研究）
Principal Engineer (Research), QuadTech

John Seymour在QuadTech任首席工程師（研究），他自1992年起已在QuadTech從事印刷、色彩理論及圖像方面的研究。John為QuadTech顏色控制系統和AccuCam的發展中起到了幫助作用。John目前擁有18項專利，並已撰寫了30餘篇技術論文。他是一名G7專家，並擔任圖像技術標準委員會和ISO TC 130，同時也是Technical Association of the Graphic Arts的董事會成員。他寫了一個筆名為“John the Math Guy”的博客，被描述為“應用數學和色彩科學都能帶來樂趣。”

John Seymour is an Principal Engineer (Research) at QuadTech, where he has been doing research in printing, color theory, and imaging since 1992. John was instrumental in the development of QuadTech's Color Control System and AccuCam. John currently holds eighteen patents and has authored thirty-some technical papers. He is a G7 expert and serves on the Committee for Graphic Arts Technologies Standards and ISO TC 130, and is a board member for the Technical Association of the Graphic Arts. He writes a blog under the pen name “John the Math Guy”, which is described as “applied math and color science with a liberal sprinkling of goofy humor. ”

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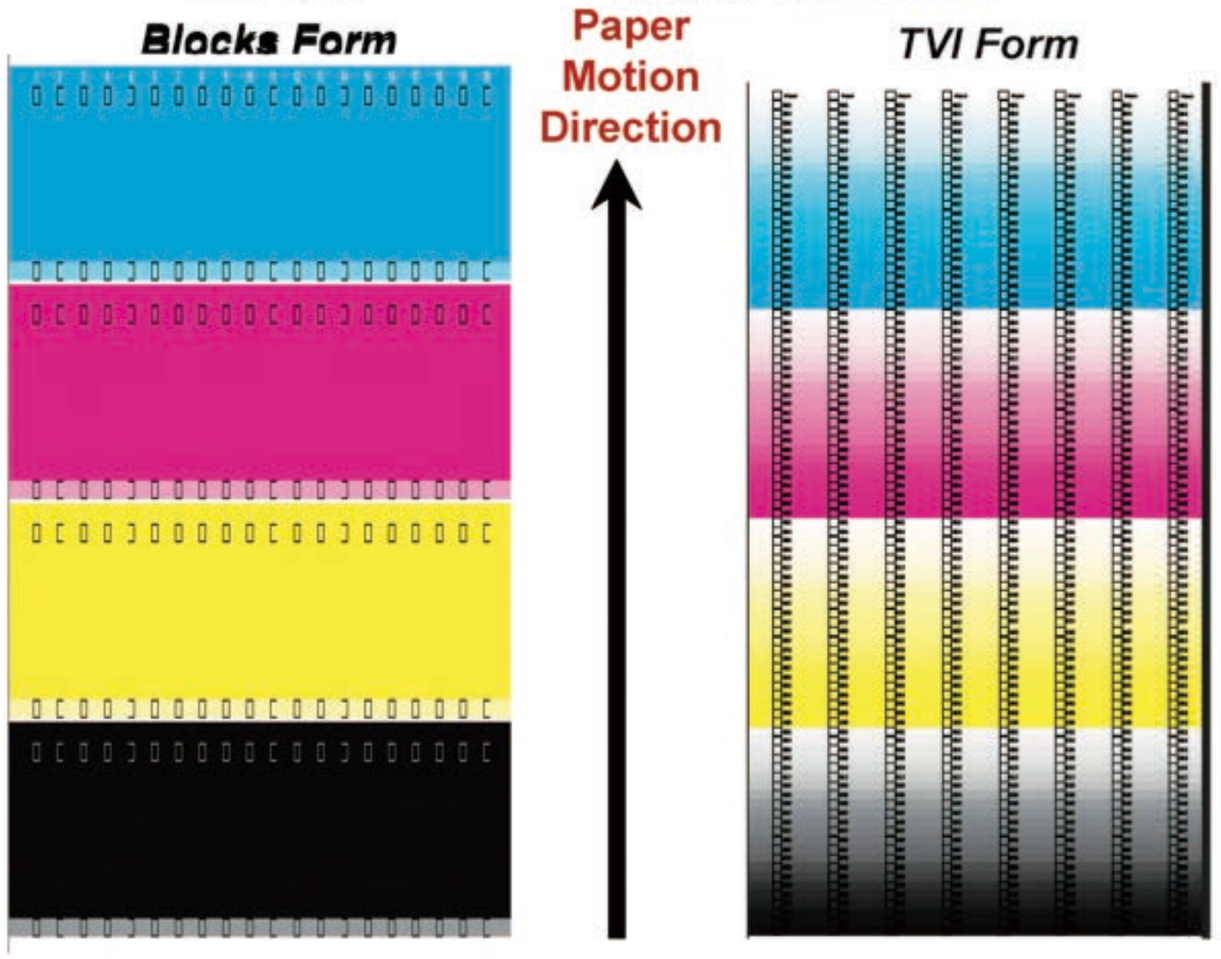
Main Theme 主題

Same input 相同輸入 Produces 產生 **Same** result 相同結果

Within a **variability**
在變化當中

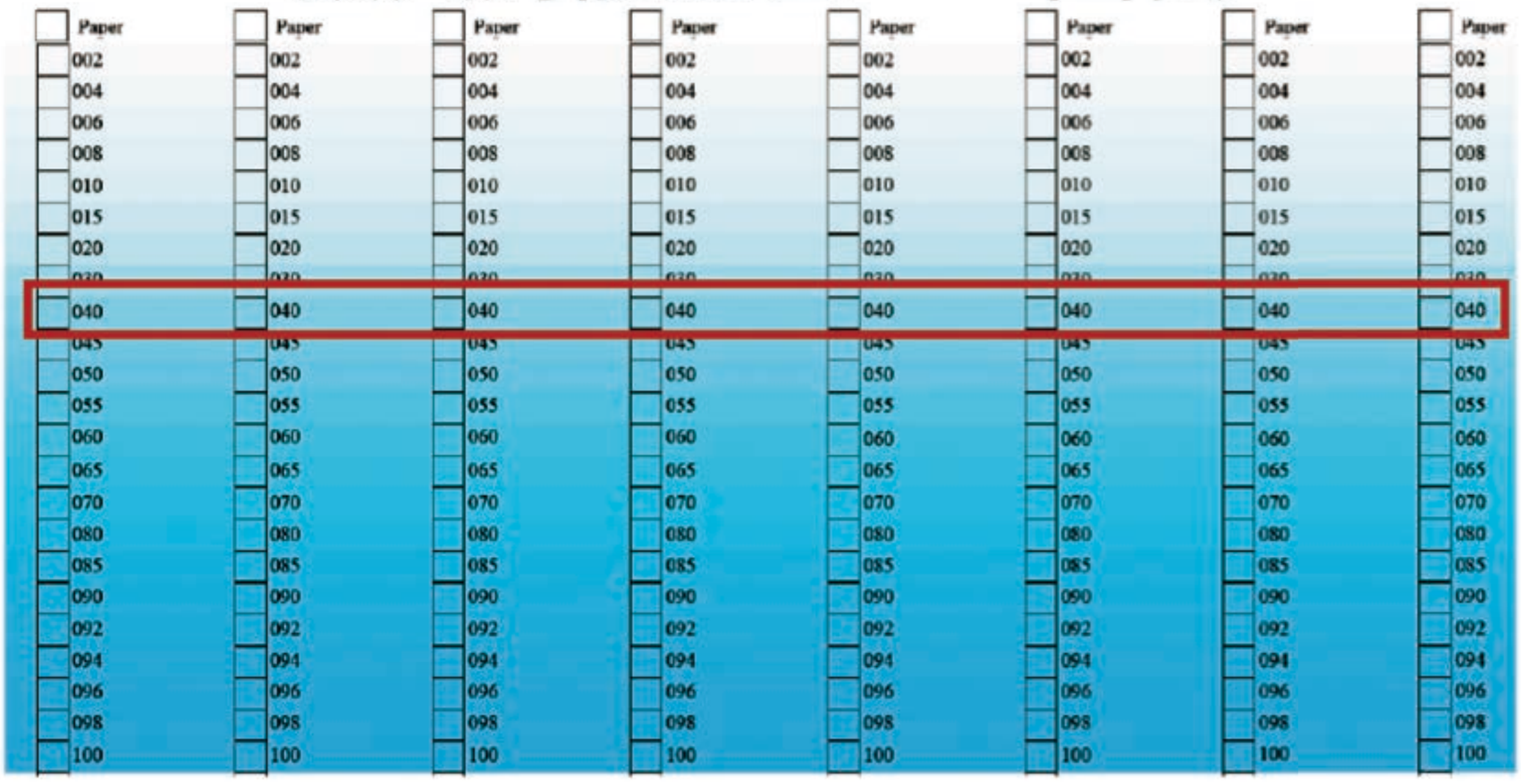
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Blocks / TVI Test **Forms**
色塊 / TVI 測試圖表



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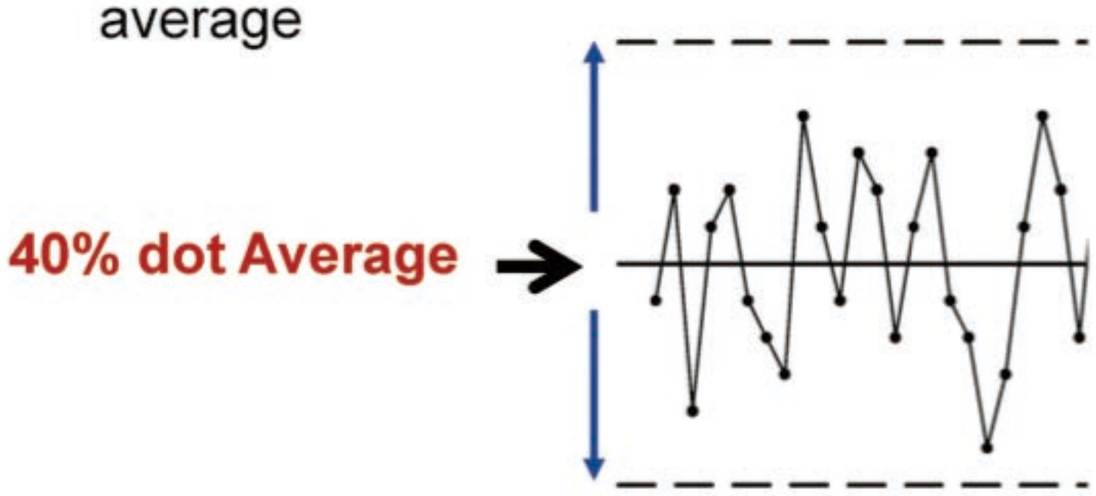
Magnified Cyan TVI Form
放大的靛藍色 TVI 圖表



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Data scatter – Variability
數據擴散－變化

- The same 40% CCD measurements will not be exactly the same.
  - Data scatter about the average
- 相同的 40% CCD 量度不會完全相同。
  - 數據擴散在平均之上



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Image-Setter System: **Goal**

製版機系統：**目標**

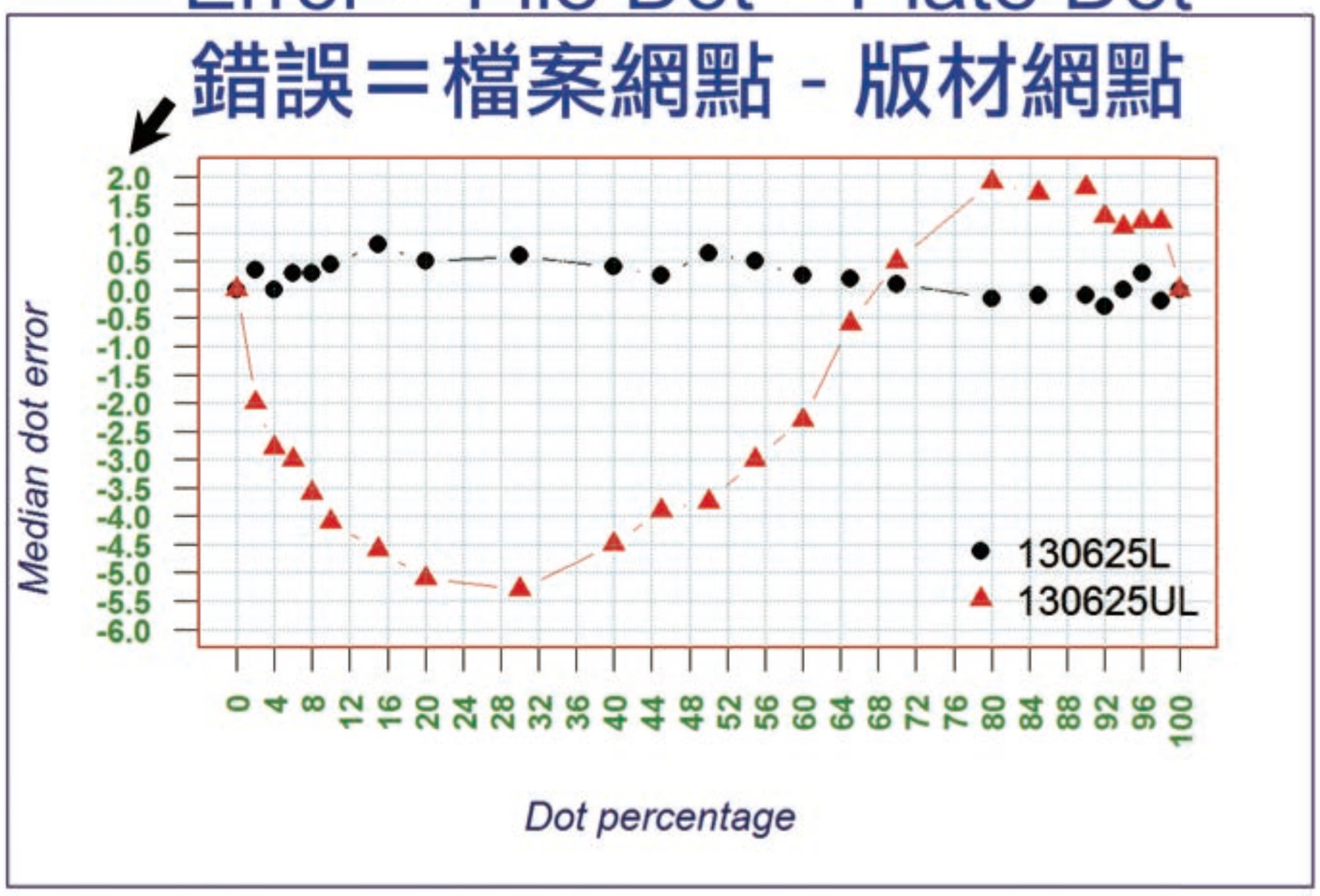
- **Computer file dot = plate dot**
- Provide a methodology to allow:
  - Linearization:
    - Force image-setter to produce intended dot on plate
  - Understanding system's **natural variability**
  - System **Diagnosis** if off target
  - **Choice** of a winning system

- 檔案中的網點 = 版材的網點
- 提供之方法，容許：
  - 線性化：
    - 迫使製版機在版材上產生應有的網點
  - 明白系統的自然變化
  - 如果不達標，就要檢查系統
  - 選擇最好的系統

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Error = File Dot – Plate Dot

錯誤＝檔案網點 - 版材網點



Dot error: un-linearized and linearized plates

Image-Setter: Test & Measure
製版機：測試 及 量度

- Set the image-setter to **mfg specs.**
- Create a plate with the TVI test form.
- With a CCD measuring device:
  - Measure and input in spreadsheet every plate spot.

- 將製版機設定至出廠規格
- 製作一塊有 TVI 測試圖表的版材
- 具備有 CCD 的量度儀：
  - 將每個網點量度及輸入至試算表

	A	B	C	D	E
1	**color**	**dot**	**keyNum**	**measuredDot**	**testDate**
2	cyan	0	1	0	130713L
3	cyan	2	1	1.9	130713L
4	cyan	4	1	3.3	130713L
5	cyan	6	1	5.8	130713L
6	cyan	8	1	7.7	130713L
7	cyan	10	1	9.4	130713L
8	cyan	15	1	14.6	130713L

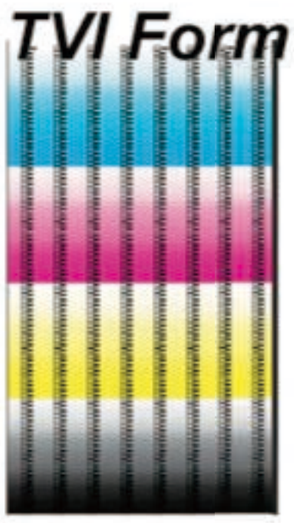


Image-Setter: **Analyze**
製版機：分析

- Graph the data in Excel
- Calculate average & variability (standard deviation) for every dot%.

1. Analyze data per **color** and per **dot%**
2. Combine colors & re-analyze per **dot%**
3. Similar average values in step 1 & 2 **??**
   - Pre-press treats CMYK the same.

- 在 Excel 中將數據以圖表表示
- 計算每個網點百分比的平均及變化 (標準差)

1. 分析每個 顏色 及 網點百分比的數據
2. 結合顏色及重新分析每個網點百分比
3. 取得在第一步和第二步得出的平均數值 **??**
   - 印前以相同方法處理 CMYK

Cyan Dot = Magenta Dot = Yellow Dot = Black Dot

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Image-Setter: **RIP Input**
製版機：輸入 RIP

- If CMYK %dots are equal for same %dots
  - **Combine** all CMYK dots
  - Set the RIP linearization curve to the average dot values.
- If CMYK %dots are **NOT** equal:
  - Create **separate** linearization curves for each color.
- Determine **variability** for every dot %

- 如果 CMYK 網點百分比是與版材的相同
  - 結合所有 CMYK 網點
  - 將 RIP 線性曲線設置至平均網點數值
- 如果 CMYK 網點百分比是與版材上的不相同
  - 製作每個顏色的獨立線性曲線
- 計算每個網點百分比的變化

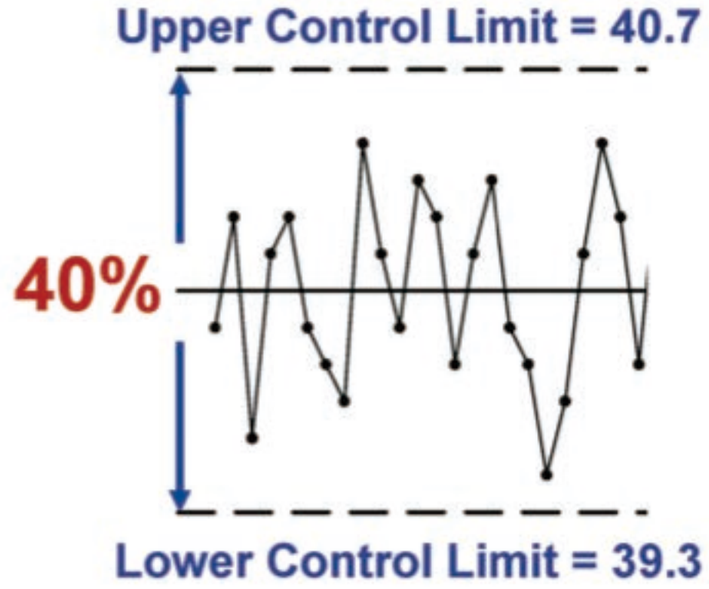
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Daily System **Check**
每日的系統檢查

- **Daily check:** should include 4 strips
- Average all 4 strips for each dot %
- If within linearized values ± variability
  - Do nothing. **Do not re-adjust your RIP.**
  - Adjusting the RIP is **tampering**
    - **Tampering pushes the system off target**

- 每日檢查: 應該包括 4 條色帶
- 將 4 條色帶的每個網點百分比數值平均化
- 如果是在線性化數值的±變化中
  - 無需理會；無需調整您的 RIP
  - 調整 RIP 是有干預性的
    - 干預會令系統不能達標

Daily System **Check:** Example
每日系統檢查：例子



Daily System Check: **Off Range?**
每日系統檢查：超出範圍？

- If system correctly linearized:
  - Do not re-linearize!
  - **Identify** root causes
    - New consumable batch,
    - Room temperature,
    - Maintenance, …etc
  - **Rectify** the issue.

- 如果系統正確地線性化：
  - 不需要重新線性化！
  - 找出根本原因
    - 新的耗材,
    - 室內温度,
    - 保養, …等等
  - 糾正問題

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How to Choose Best Components?
如何選擇最佳組合？

- The best system should be:
  - Digital values = **Average** dots on plate
  - The lowest **variability** across the plate for every dot %
- Applies to:
  - Image-setter
  - Aluminum plate
  - Chemistries

- 最佳系統應該是：
  - 數碼數值＝版材上的平均網點
  - 在版材上每個百分比的網點具最低變化
- 應用於：
  - 製版機
  - 版材
  - 化學品

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Prepress system **Summary**
印前系統總結

- We have a methodology to:
  - Linearize the system
  - Quantify & control performance
  - Choose the perfect system

- 我們一定要有方法去：
  - 將系統線性化
  - 將表現量化及控制
  - 選擇最佳的系統

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Press System: **Goal**

印刷機：**目標**

- Same **image/key value** = Same **density** for:
  - All presses, press keys, press speeds, solids & dot%
- Understanding system's natural variability
- System Diagnosis if off target
- Choice of a winning system

- 相同圖像 / 墨匙數值 = 相同的密度：
  - 所有印刷機、印刷墨匙、印刷速度、實地及網點百分比
- 明白系統的自然變化
- 如果不達標，要檢查系統
- 選擇最佳的系統

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Press: **Testing**

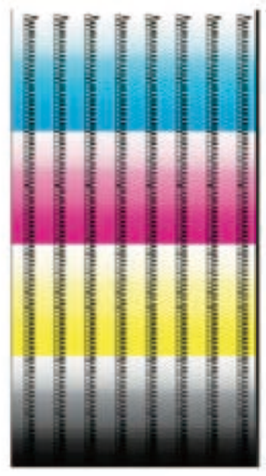
印刷：**測試**

- Three press tests:
  - Zeroing test with no image and no water
  - Blocks Test: uniform solid (100%) image
  - TVI Test: uniform variable dot image

- 三個印刷測試：
  - 零點測試，沒有圖像及沒有水
  - 色塊測試：統一實色圖像 (100%)
  - TVI 測試：統一變化網點圖像







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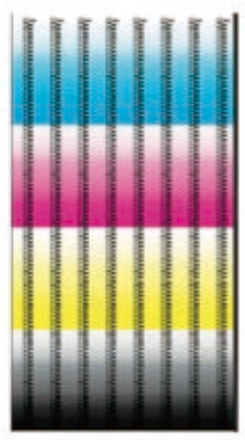
Press: Testing – All Tests
印刷：測試－所有測試

- To reduce variables & speed-up testing:
  - Set all press ink keys the same
  - Use the same image across the entire press,
  - Set all press keys the same
  - Evaluate inking with & without dampening

- 要減少變數和加速測試：
  - 將所有印刷墨匙設置相同
  - 在整個印刷生產中使用相同圖像
  - 將所有印刷墨匙設置相同
  - 評估有潤版及沒有潤版系統的著墨







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Press: Zeroing Test
印刷：零點測試

- Test conditions:
  - Set press to mfg specs.
  - Blank plate, no image
  - **No** dampener, **one color at a time**
  - Full ink fountain
  - All press keys set to zero
  - Use any paper
  - Low press speed to conserve paper.
- Needed result: very light **EVEN** print

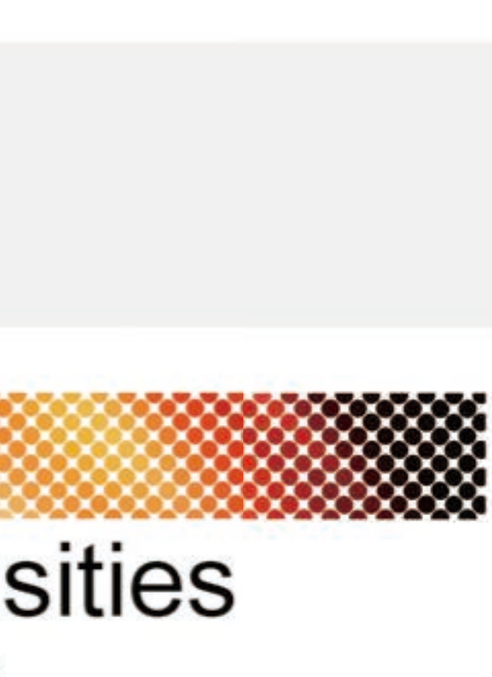
- 測試狀態：
  - 將印刷機設置至出廠規格
  - 空白版材、沒有圖像
  - 沒有潤版系統, 一次只有一個顏色
  - 佈滿油墨
  - 所有印刷墨匙設置零
  - 使用任何紙張
  - 低的印刷速度以保護紙張
- 所需結果：非常平均的印刷

Press: **Block** Test

印刷：色塊測試

- Test conditions:
  - Uniform image plate
  - **With** calibrated dampener
  - Full ink fountain
  - All press **keys set the same**
  - Use any paper
  - Production press speed.
- Needed result: **EVEN** density

- 測試狀態：
  - 統一圖像的版材
  - 具備已校正的潤版系統
  - 佈滿油墨
  - 所有印刷墨匙相同設置
  - 使用任何紙張
  - 印刷生產速度
- 所需結果：平均密度

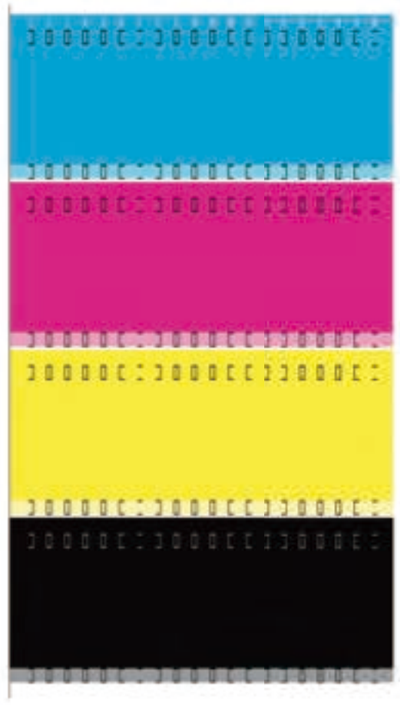


Press: **Measure** Densities

印刷：量度密度

- Measure solid density **inside** each square
  量度每方格內的實地密度
- Record data in a spreadsheet
  將數據記錄在試算表

1	Sample	Dot%	Color	Column	Density
2	1	100	Cyan	1	0.86
3	1	100	Cyan	2	0.88
4	1	100	Cyan	3	0.87
5	1	100	Cyan	4	0.9
6	1	100	Cyan	5	0.91
7	1	100	Cyan	6	0.94
8	1	100	Cyan	7	0.94
9	1	100	Cyan	8	0.94
10	1	100	Cyan	9	0.94
11	1	100	Cyan	10	0.94
12	1	100	Cyan	11	0.92
13	1	100	Cyan	12	0.96



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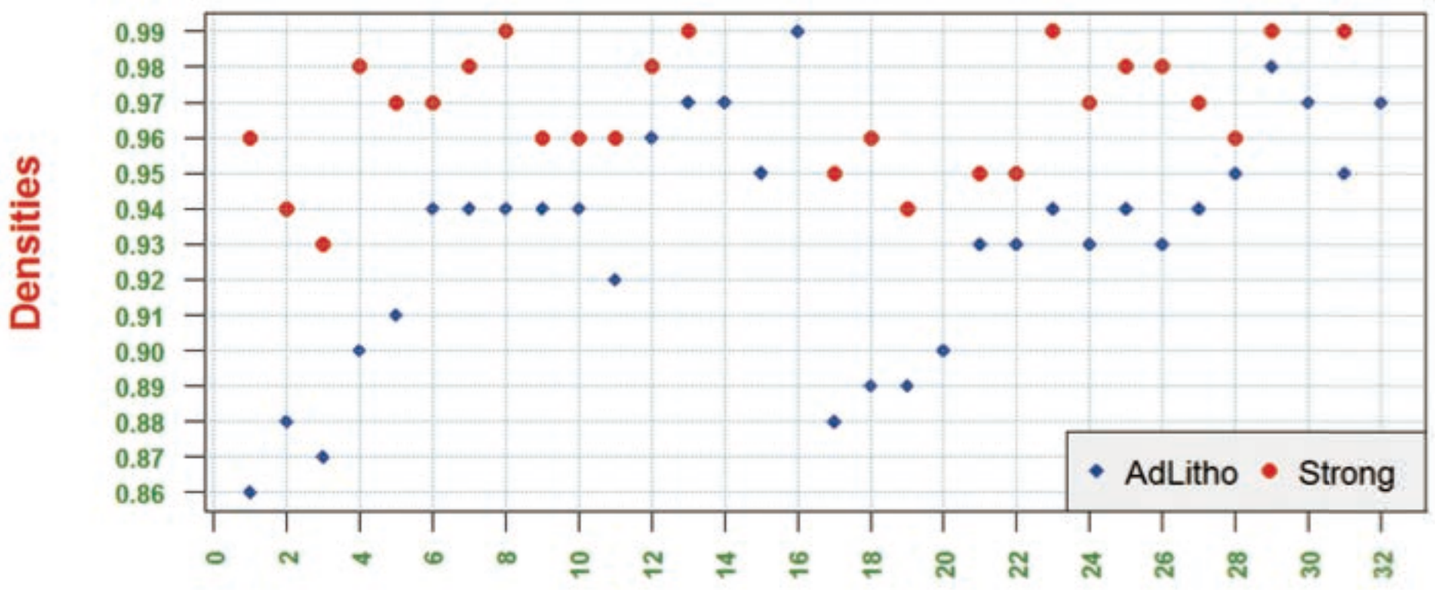
Press: **Analyze** Densities
印刷：**分析**密度

- Graph densities in Excel and view pattern
- Density variation has **no pattern??**
  - **Yes**: press is set-up correctly
  - **No**: systematic press issue
    - Correct to eliminate pattern
- Calculate average & variability (standard deviation.)

- 在 Excel 中將密度值繪畫成曲線以及觀察其形態
- 密度變化**沒有圖案 ??**
  - 對: 印刷機設置正確
  - 不對：印刷機系統性的問題
    - 修正至去除圖案
- 計算平均值及變化值 (標準差)

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Scatterplots for Cyan Densities



How to Choose Best Components?
如何選擇最佳組合？

- The best system should be:
  - Higher **average** solid densities for the same ink rheology
  - The lowest **variability** across the press
- Applies to:
  - Ink, dampening solution, blankets, … etc

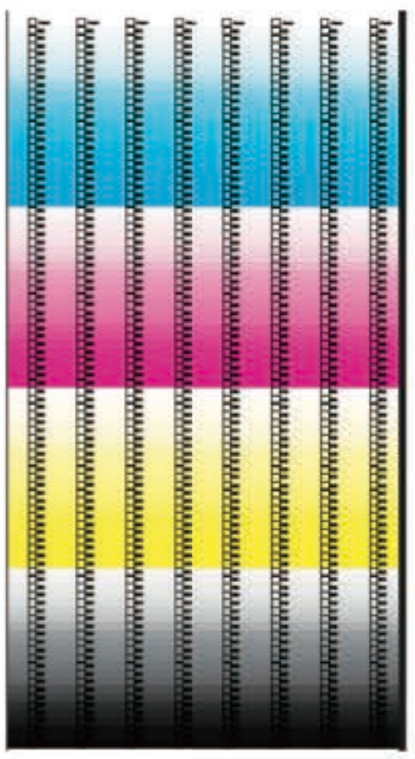
- **最佳系統應該是：**
  - 相同流變特性的油墨應具較高的平均實地密度
  - 在印刷機上最低的變化
- **應用於：**
  - 油墨、潤版液、橡皮布等



Press: TVI Test
印刷：TVI 測試

- Test conditions:
  - Uniform image plate
  - **With** calibrated dampener
  - Full ink fountain
  - Set **Solids** to **density specs**
  - Use frequently used paper
  - Production press speed
- Needed result: required solid density

- **測試條件：**
  - 統一圖像的版材
  - 已校正的水斗
  - 佈滿油墨
  - 將實色設置密度的規格
  - 使用常用紙張
  - 印刷生產速度
- **所需結果：達到所需的實地密度**



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Density versus CIELAB
密度與 CIELAB

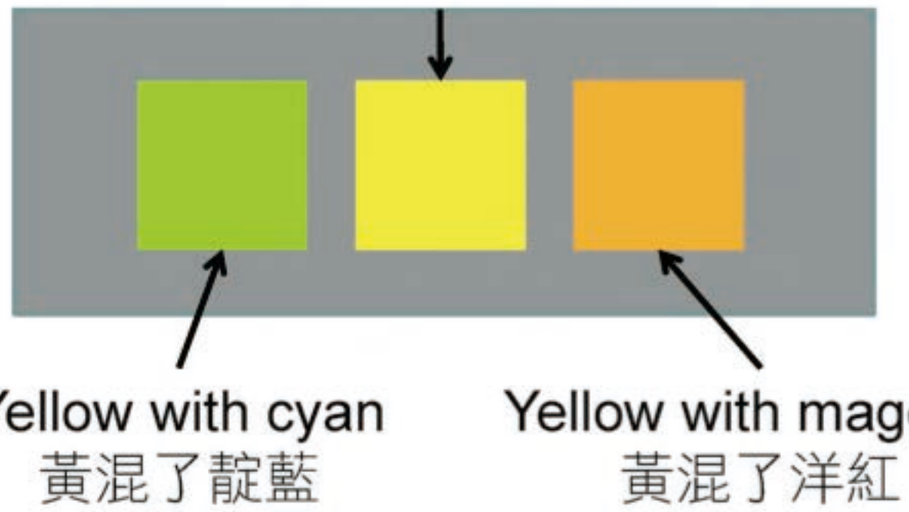
- Density is a single number, so it is user-friendly
- It is useful because
  - Density relates (loosely) to ink film thickness
  - Density relates (loosely) to the color that we see

- 密度是單一數值，所以很容易使用
- 這是很有用，因為
  - 密度與油墨厚度相關
  - 密度與我們所見的顏色相關

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Density does not predict color
密度不能預測顏色

Pure yellow ink
純黃墨



Yellow with cyan
黃混了靛藍

Yellow with magenta
黃混了洋紅

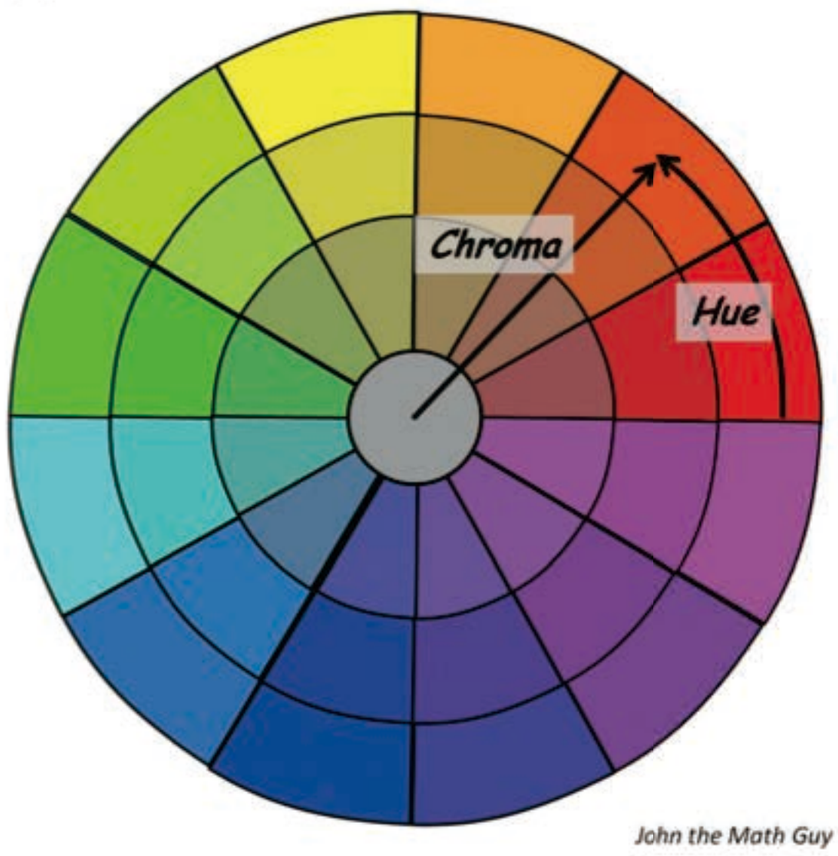
These patches might have the same density
這些色塊都可能具相同的密度

Density versus CIELAB
密度與 CIELAB

- ISO 12647 specifies L*a*b* of CMYK solids
  ISO 12647 訂明的 CMYK 實地的 L*a*b*
- ISO 12647 does not specify density
  ISO 12647 沒有訂明密度

Quick review of CIELAB
快速回顧 CIELAB

- Colors can be characterized in terms of
  顏色可以如下表示
  - Chroma 彩度
  - Hue 色相

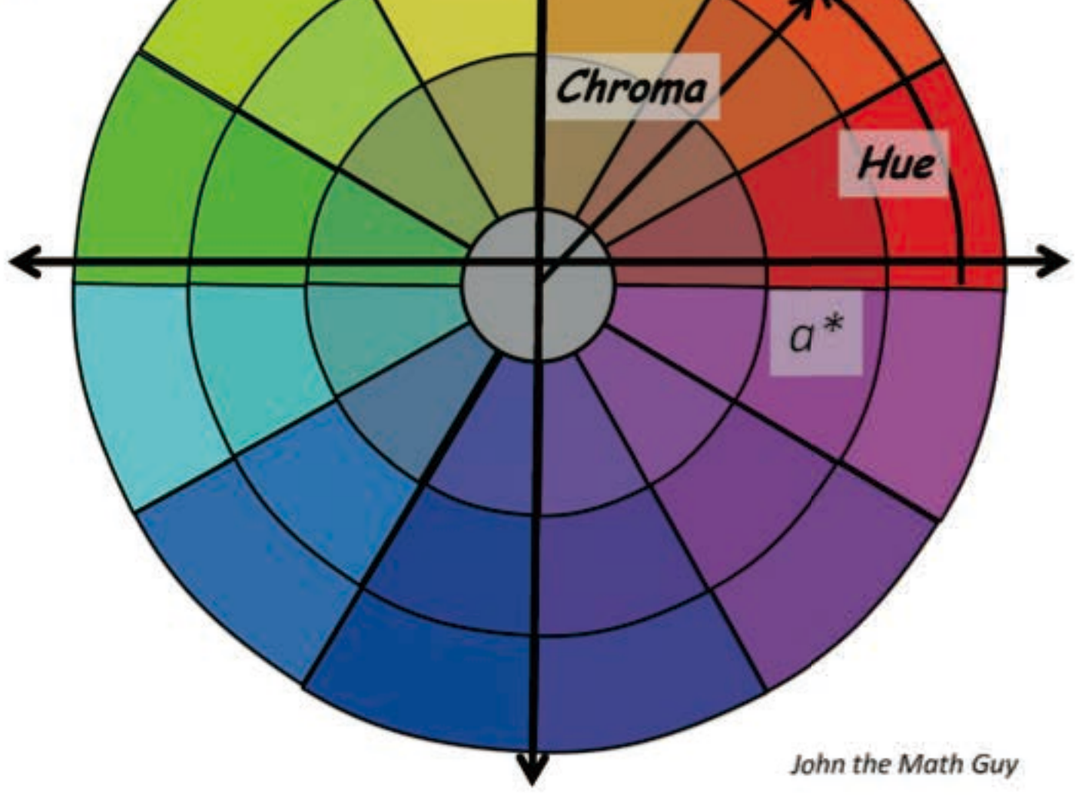


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Quick review of CIELAB
快速回顧 CIELAB

- Or in terms of
  或如下表示

  – a*
  – b*

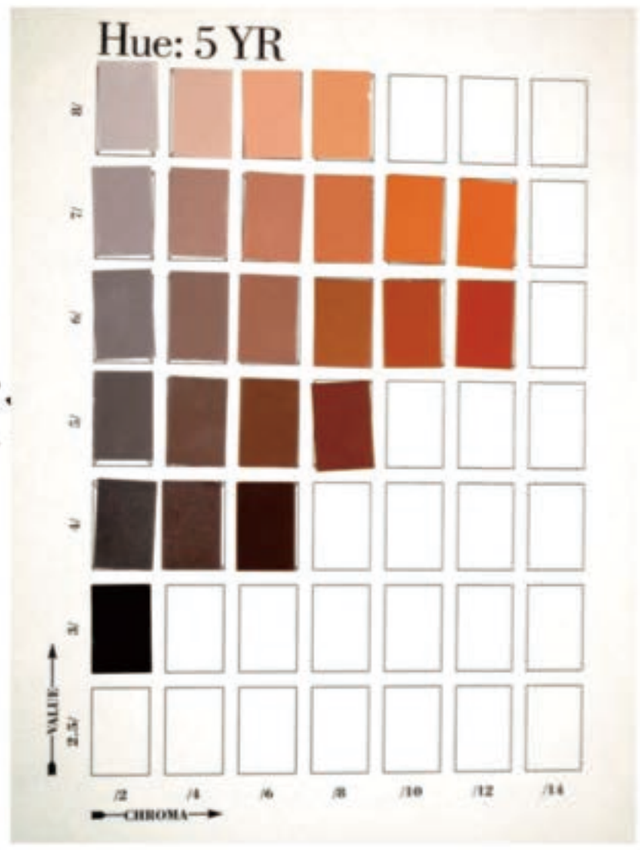


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Quick review of CIELAB
快速回顧 CIELAB

- All colors of a particular hue can be characterized in terms of
  在某一個色相的所有顏

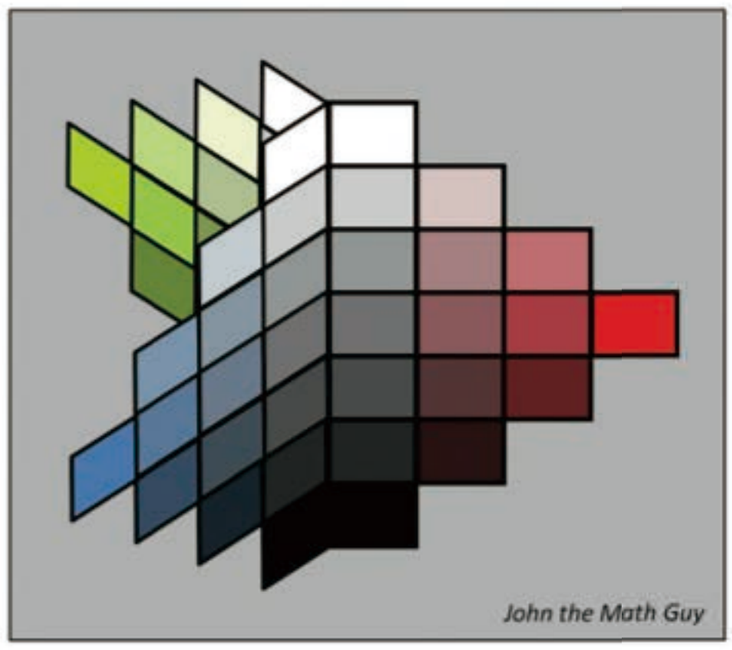
  – Lightness 亮度
  – Chroma 彩度



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Quick review of CIELAB
快速回顧 CIELAB

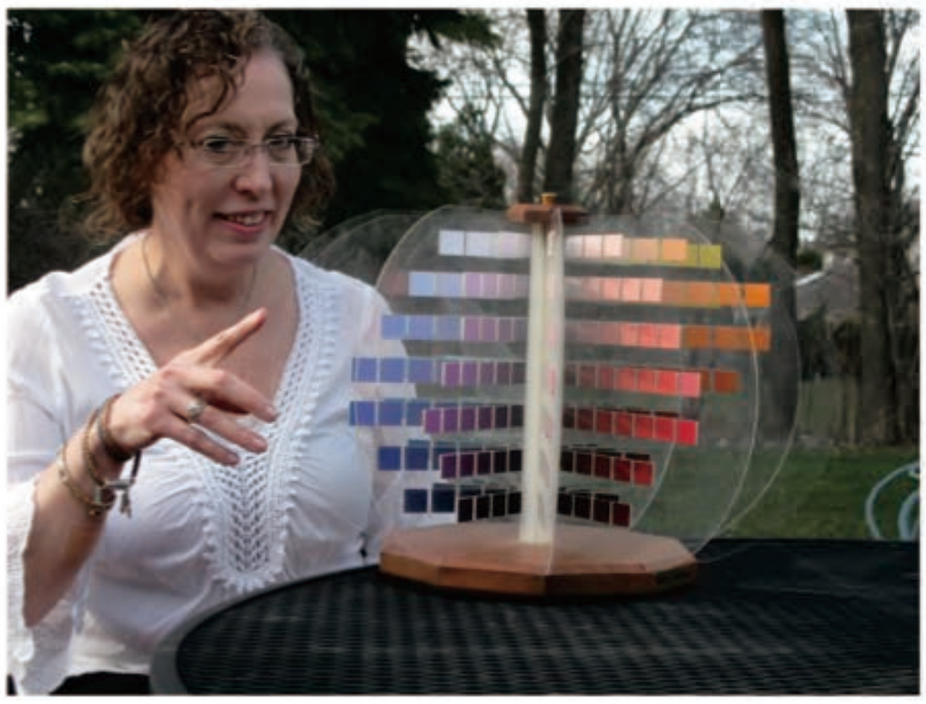
- Color is three dimensional
  顏色是三維空間
  - Lightness 亮度
  - Hue 色相
  - Chroma 彩度



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Quick review of CIELAB
快速回顧 CIELAB

- Color is three dimensional
  顏色是三維空間
  - Lightness 亮度
  - Hue 色相
  - Chroma 彩度
    (L*a*b*)



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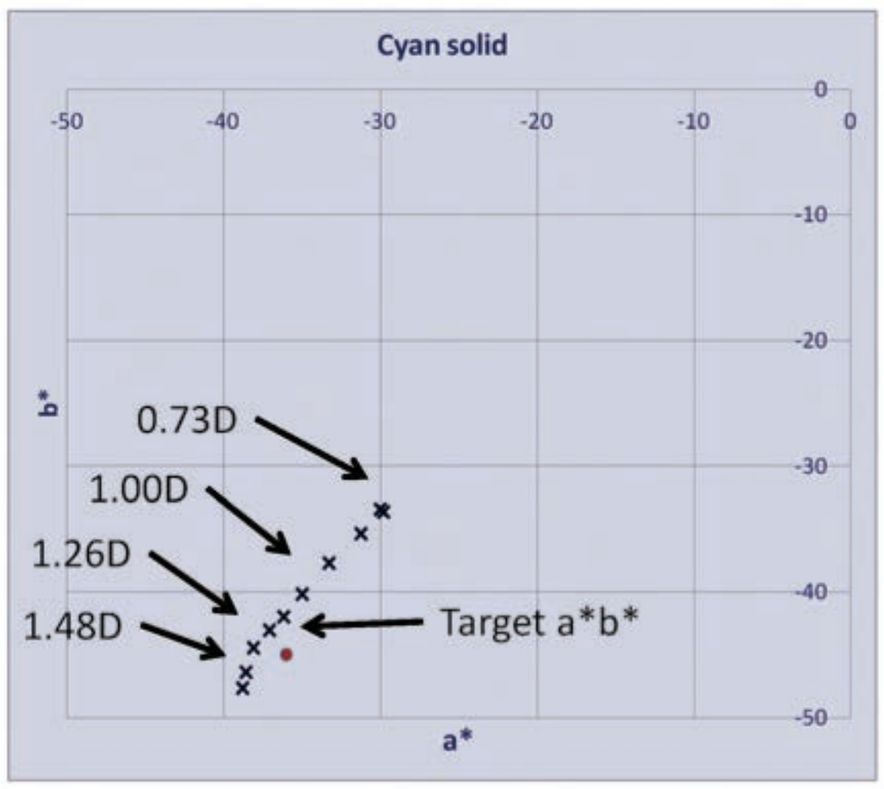
Density and CIELAB
密度與 CIELAB

- ISO 12647 specifies L*a*b* of CMYK solids
- ISO 12647 does not specify density
- How do you find the correct density?
- We need to find the relationship between the two

- ISO 12647 列明了CMYK實色的 L*a*b*
- ISO 12647 沒有列明密度
- 你如何找到正確密度？
- 我們需要找出兩者關係

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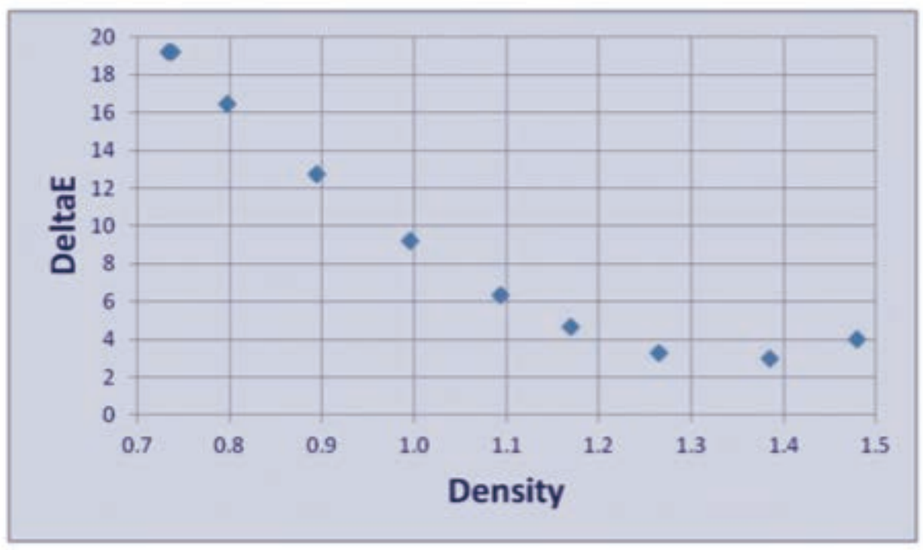
Cyan color as density changes
當密度改變，靛藍亦改變



What density should I run to?
我們應該使用什麼密度？

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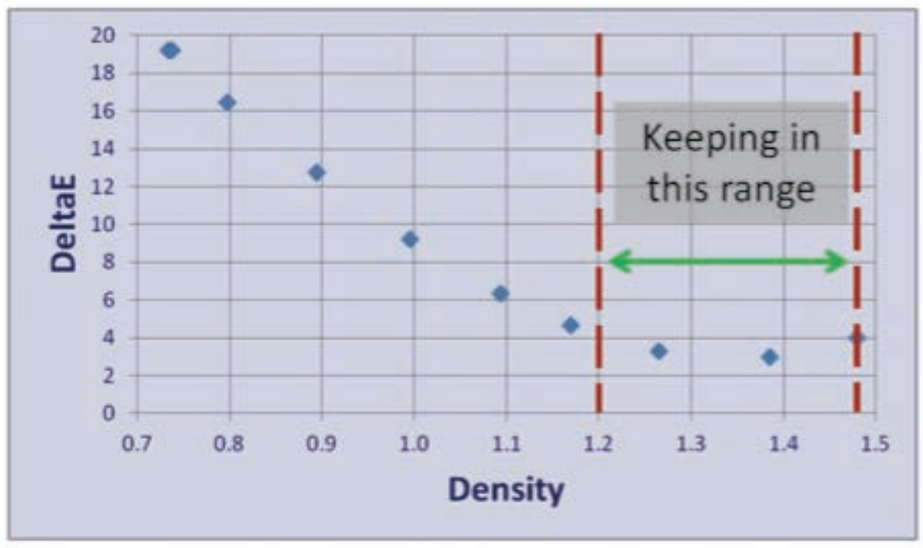
Different view of the same data
相同數據的不同觀點



What density should I run to?
我們應該使用什麼密度?

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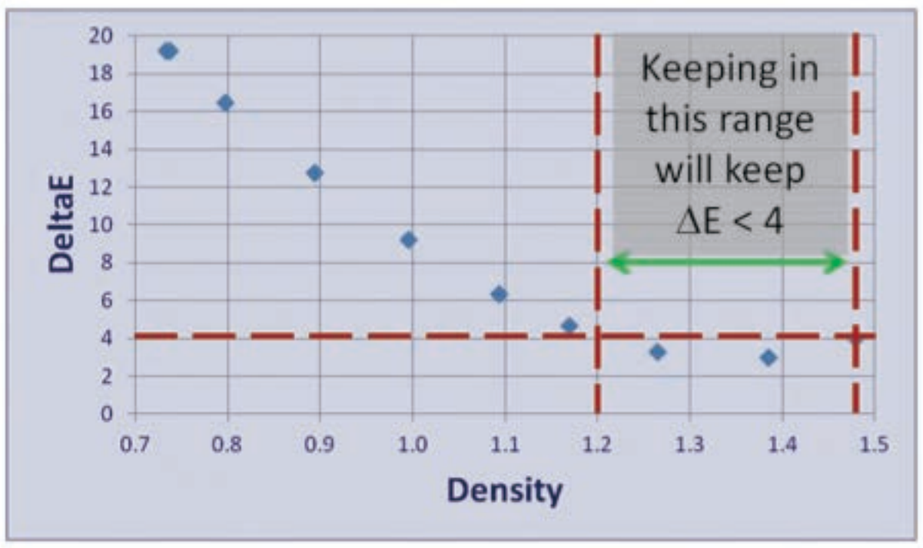
ISO 12647 control
ISO 12647之控制



What density should I run to?
我們應該使用什麼密度？

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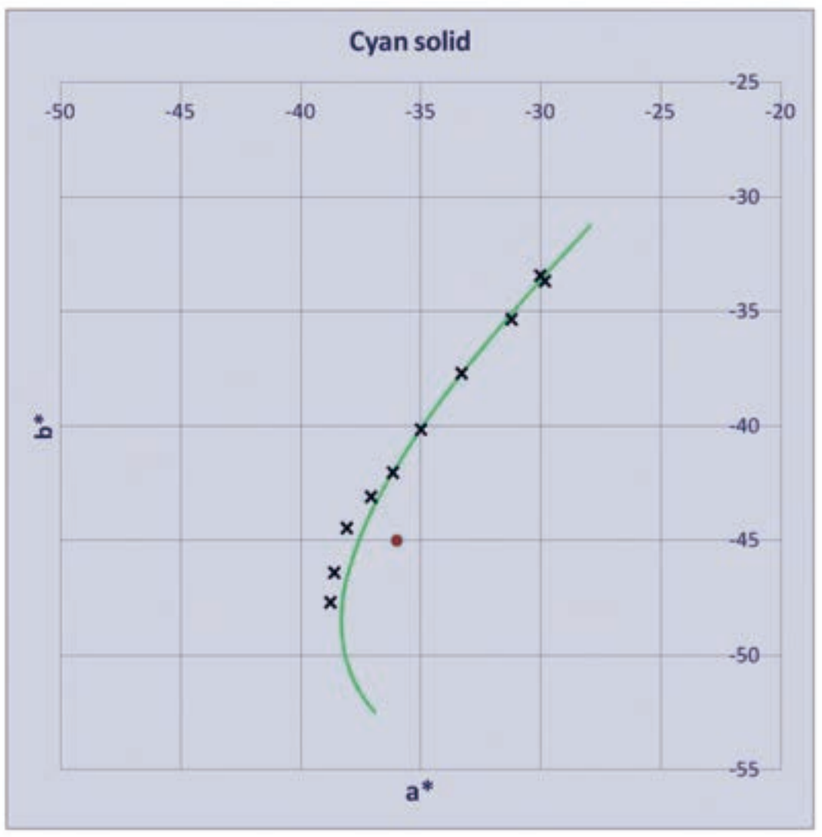
ISO 12647 control
ISO 12647之控制



What density should I run to?
我們應該使用什麼密度？

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Ink trajectory 油墨軌跡

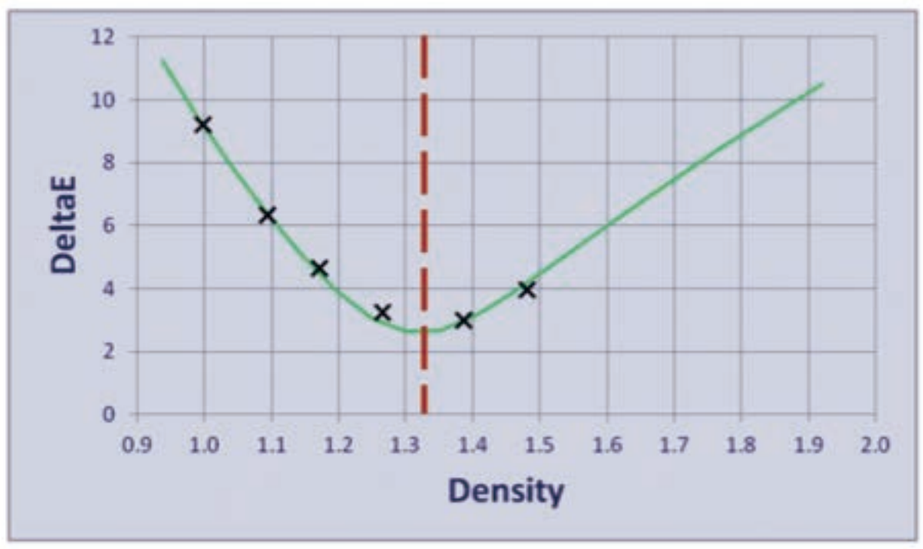


The green line is the estimated ink trajectory.
綠色線是估計的油墨軌跡。

This was computed from the spectra at 1.09D, using Beer's law.
這是根據 Beer's 定律，以光譜值 1.09D 計算出來。

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Ink trajectory 油墨軌跡



Beer's law can be used to estimate the "perifarbe" density from a single measurement.

Beer's 定律能夠用以估算單一量度中最接近顏色的密度

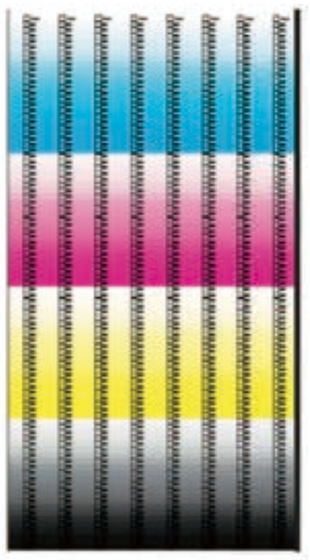
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Press: **Measure** Densities

印刷：量度密度

- Measure **solid** & **dot densities**
  量度實地及網點密度
- Record data in a spreadsheet
  記錄數據在試算表

1	Sample	Dot%	Color	Column	Density
2	1	40	Cyan	1	0.63
3	1	40	Cyan	2	0.61
4	1	40	Cyan	3	0.61
5	1	40	Cyan	4	0.64
6	1	40	Cyan	5	0.67
7	1	40	Cyan	6	0.66
8	1	40	Cyan	7	0.66
9	1	40	Cyan	8	0.66
10	1	40	Cyan	9	0.66
11	1	40	Cyan	10	0.66
12	1	40	Cyan	11	0.67
13	1	40	Cyan	12	0.66

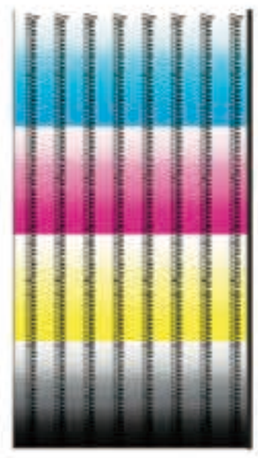


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Press: **Analyze** Densities
印刷：分析密度

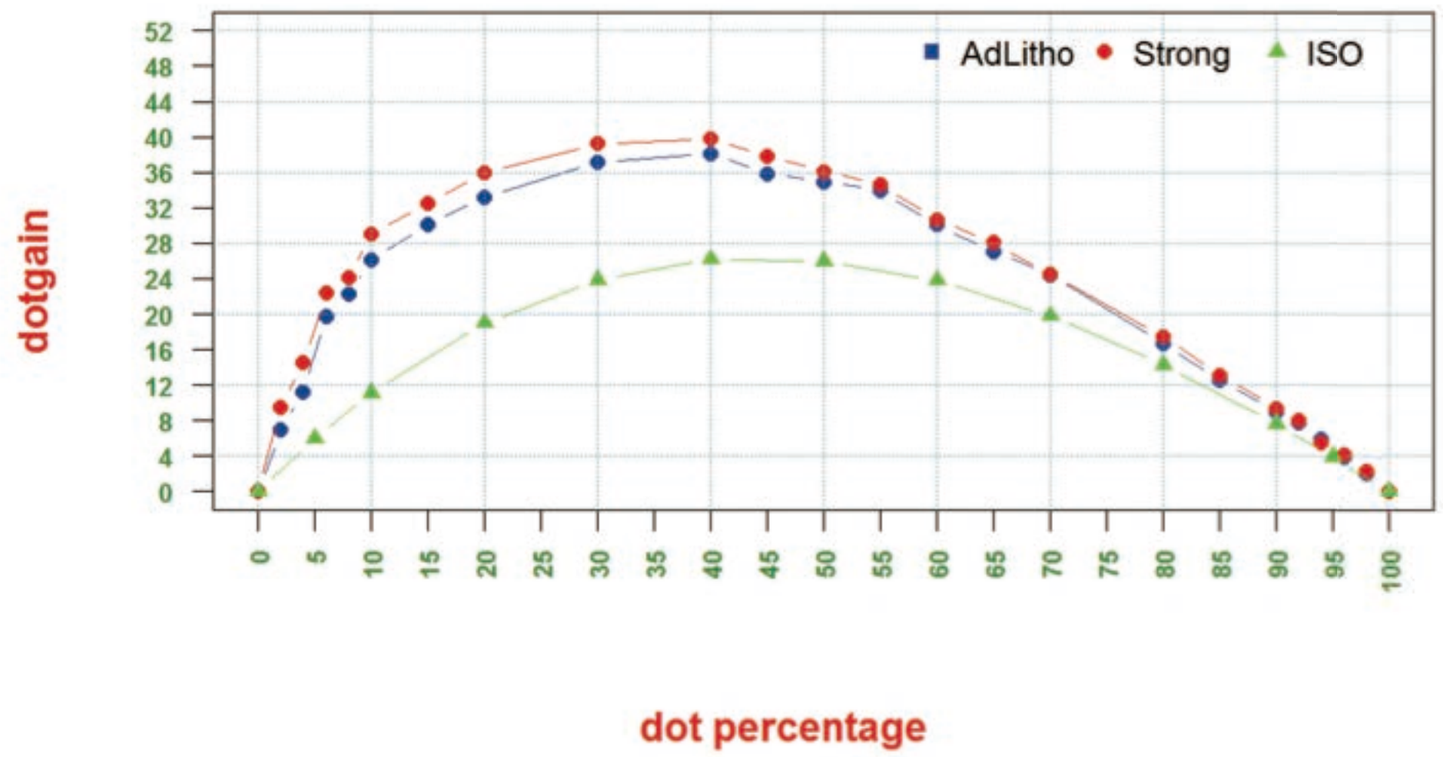
- Graph densities & view pattern **per dot%**
- Calculate average & variability
- **Exclude** columns if **solid** density is off-spec
- Calculate TVI for **on-spec columns**
- Input TVI values in prepress
- **FORCE** TVI to match ISO Specs
- Reprint with new TVI settings
- Revaluate TVI

- 將密度繪畫成圖及觀其每個網點百分比的形態
- 計算平均及變化值
- 假如實地密度是超出目標，則不包括該欄
- 計算達標 TVI 的欄
- 在印前輸入TVI 數值
- 迫使 TVI 要匹配 ISO 規格
- 使用新的 TVI 設定重新印刷
- 重新估計 TVI



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dotgain for AdLitho, Strong and SNAP Standards



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How to Choose Best Components?
如何選擇最佳組合？

- The best system should be:
  - Provides lower average TVI
  - Lower TVI variability for each dot%
  - Higher **average** solid densities for the same ink rheology
- Applies to:
  - Ink, dampening solution, blankets, … etc

- **最佳系統應該是：**
  - 提供較低的平均 TVI
  - 每個網點百分比較低的 TVI 變化
  - 在相同流變特性的油墨，應具較高的平均實地密度
- **應用於：**
  - 油墨、潤版液、橡皮布等

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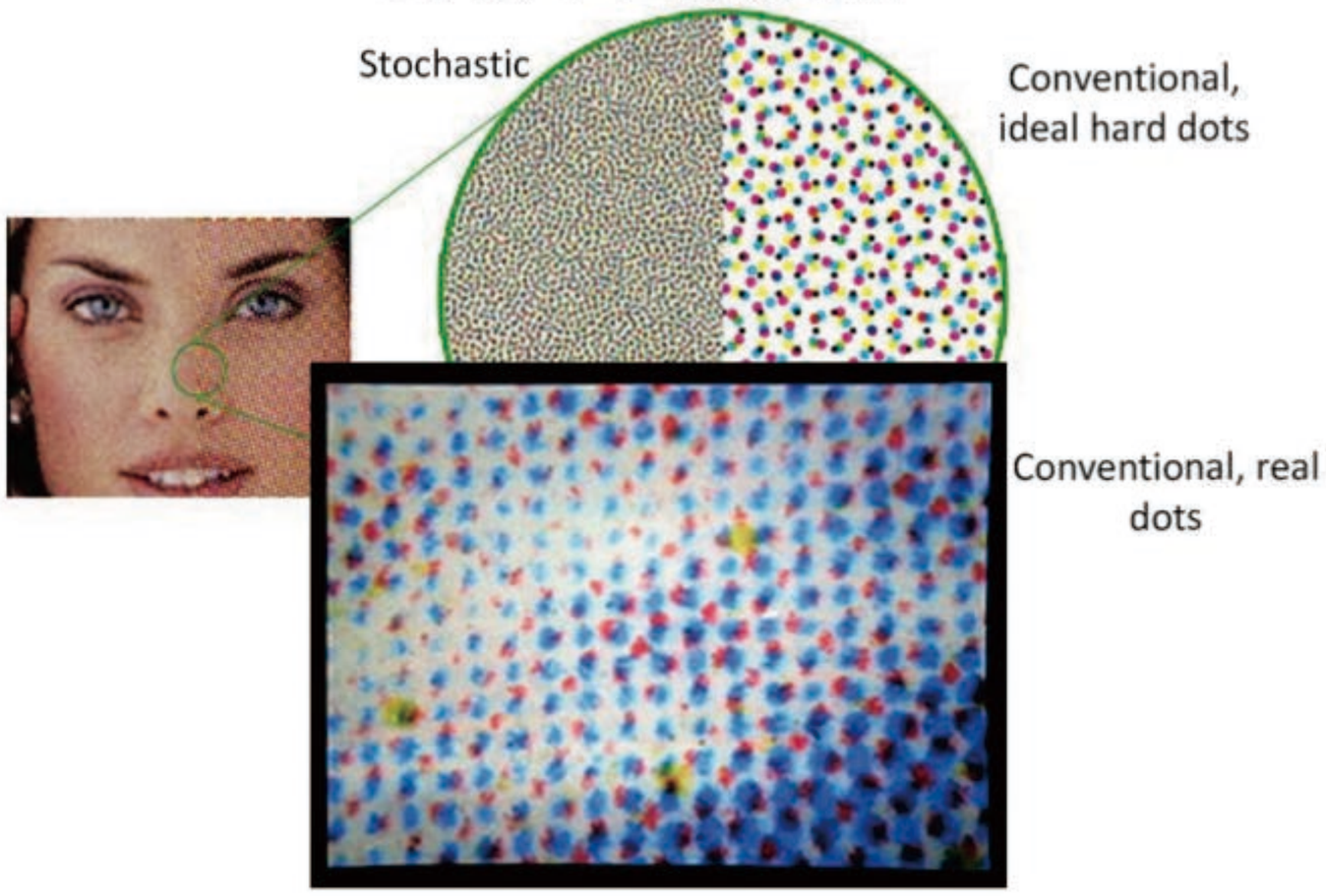
Press system **Summary**
印刷系統總結

- We have a methodology to:
  - Use simple and effective **test forms**
  - **Calibrate** a press with and without water
  - Evaluate **TVI** & match ISO spec
  - Choose the perfect system

- **一個方法：**
  - 使用簡單及有效的測試印張
  - 使用水或不使用水去校正印刷機
  - 評估 TVI 及匹配 ISO 規格
  - 選擇完美的系統

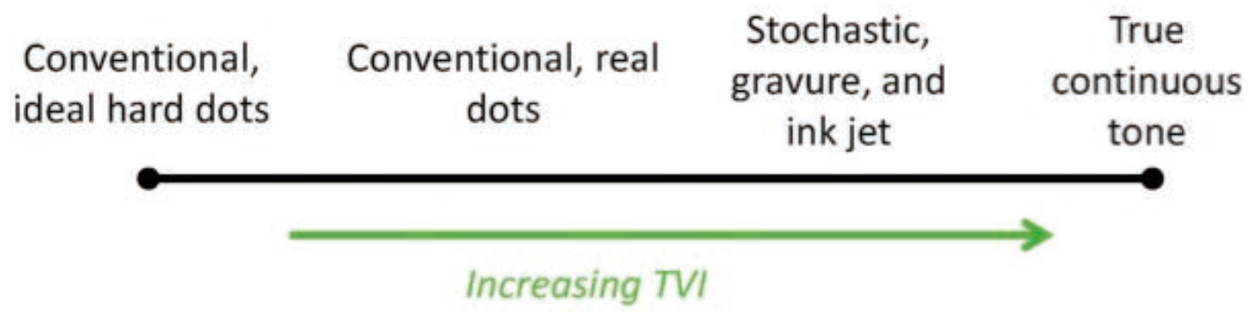
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Comparison of halftone dots
比較半色調網點



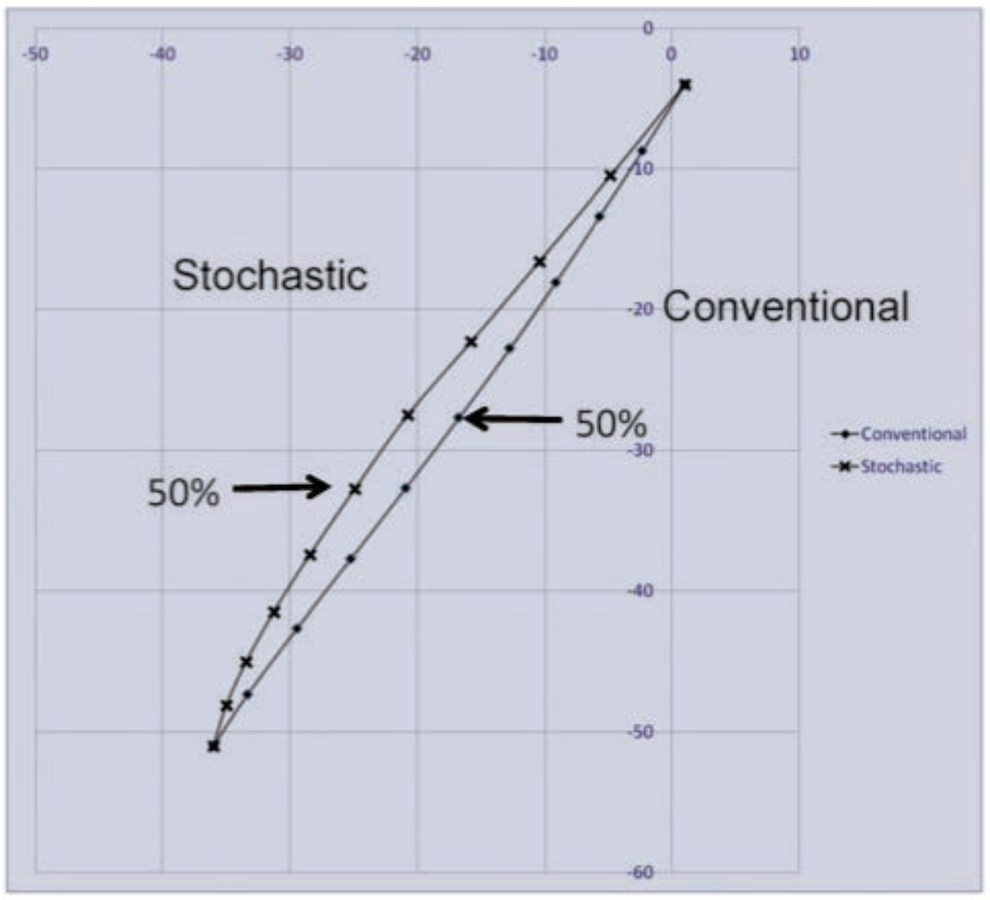
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Comparison of halftone dots
比較半色調網點



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Cyan ink – comparison of different screening
靛藍色油墨－不同的網點之比較



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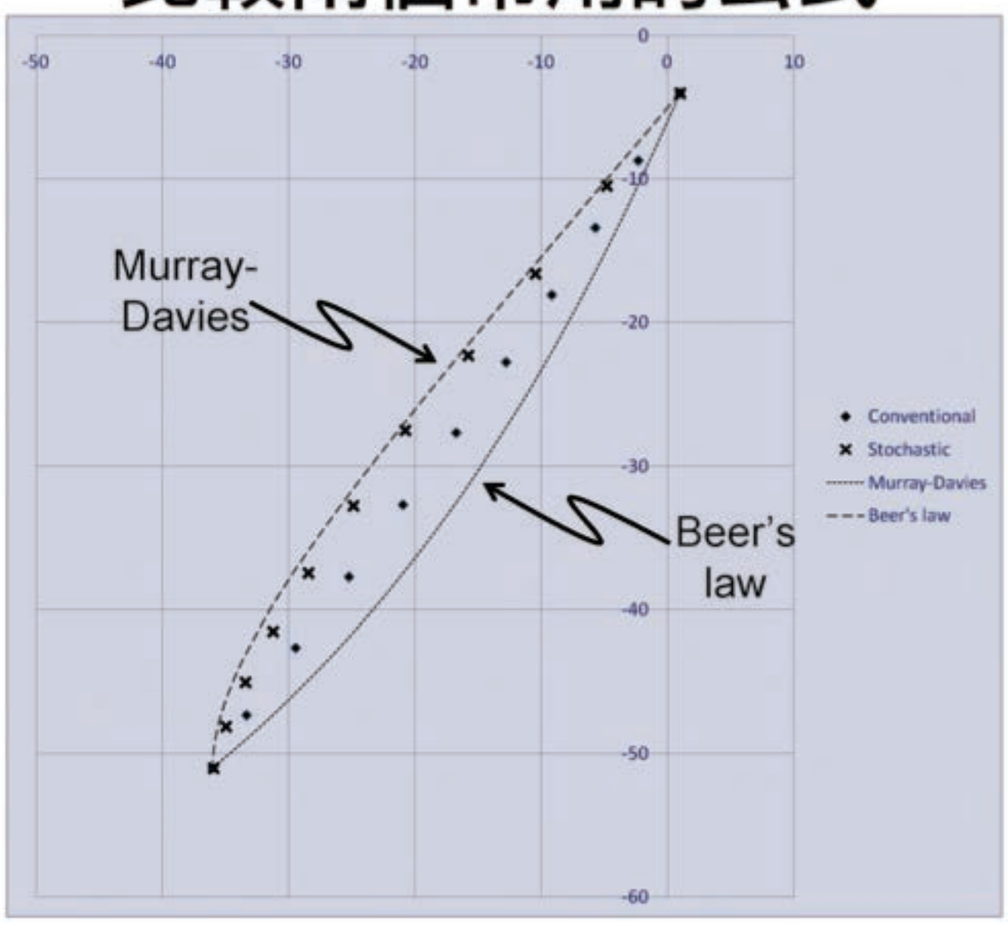
Cyan ink – comparison of different screening
靛藍色油墨－不同的網點之比較

- Stochastic has much higher TVI (tone value increase)
  調頻網具有較高的TVI (階調擴大值)

- Stochastic is greener; conventional is bluer
  調頻網是偏綠，傳統調幅網是偏藍

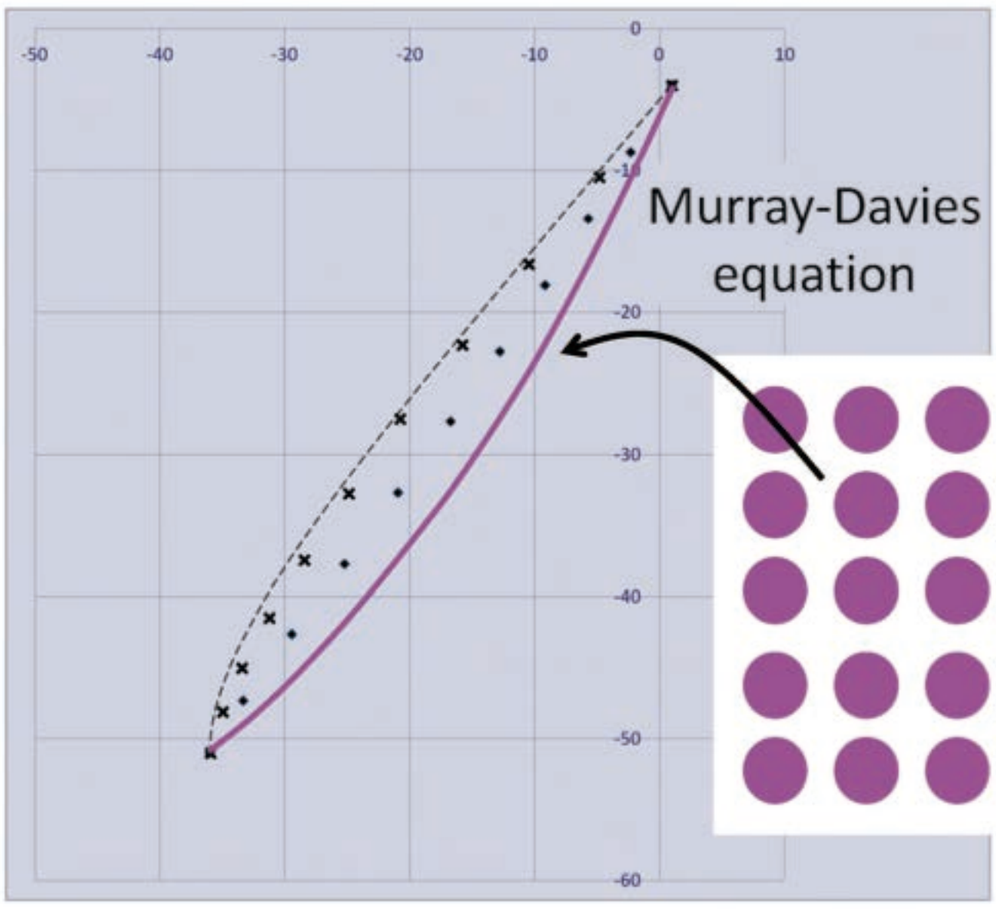
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Comparison to two popular equations
比較兩個常用的公式



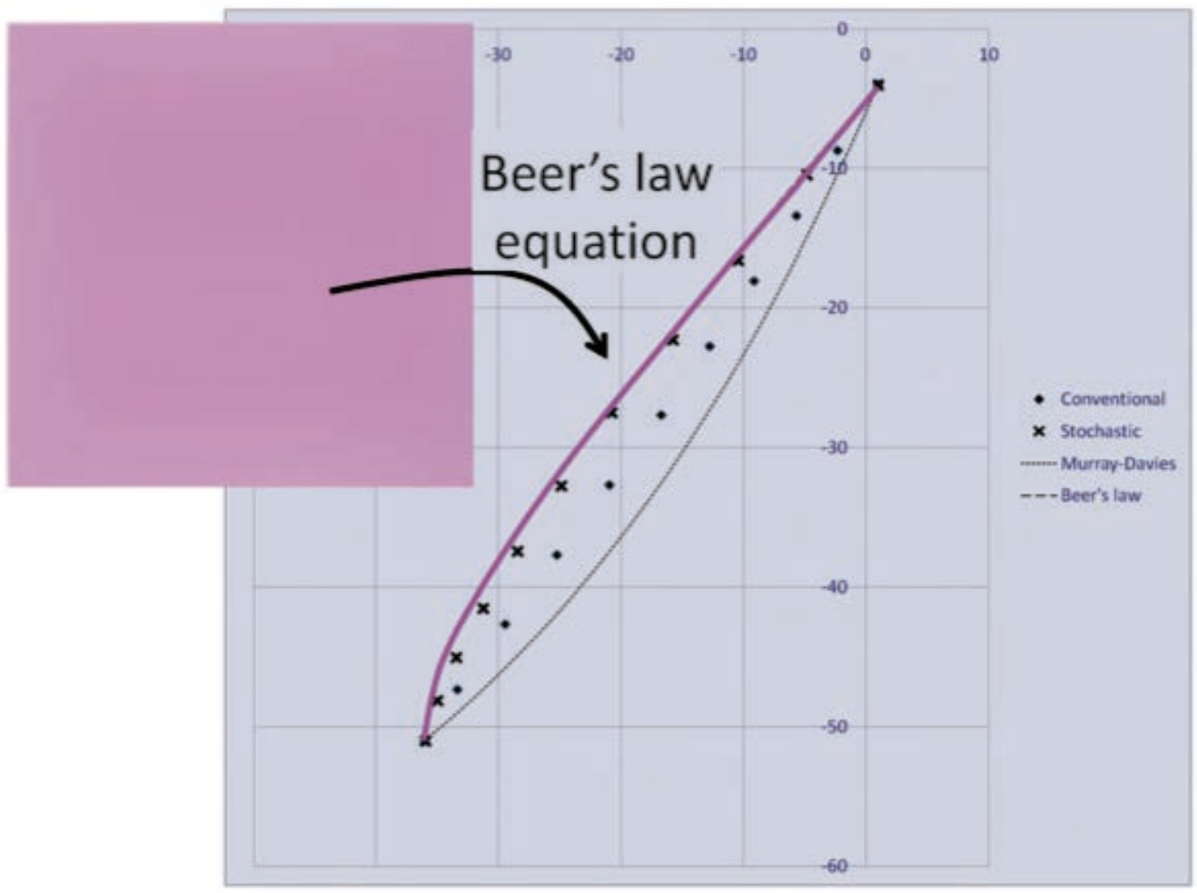
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Equation for perfect hard dots
完美的點的公式



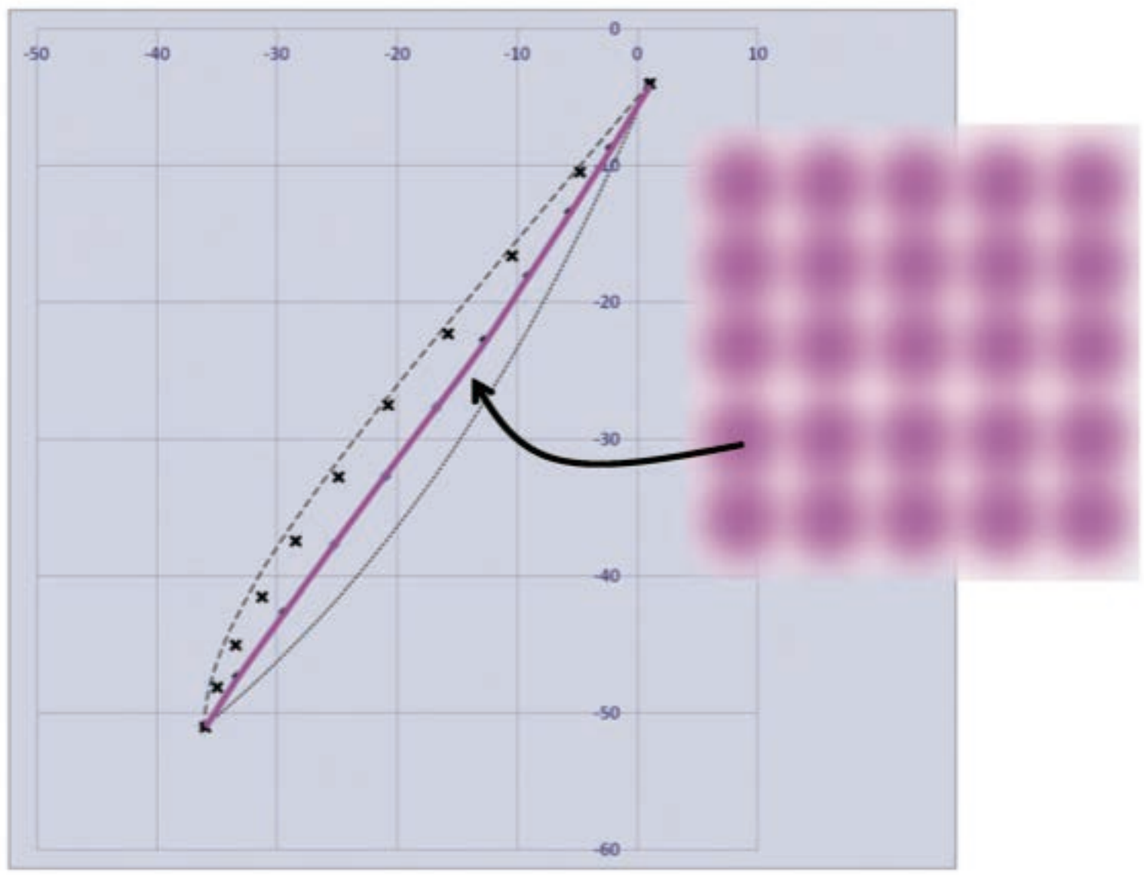
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Equation for perfect continuous tone
完美的連續色調公式



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Curve for mushy dots
模糊的點的曲線



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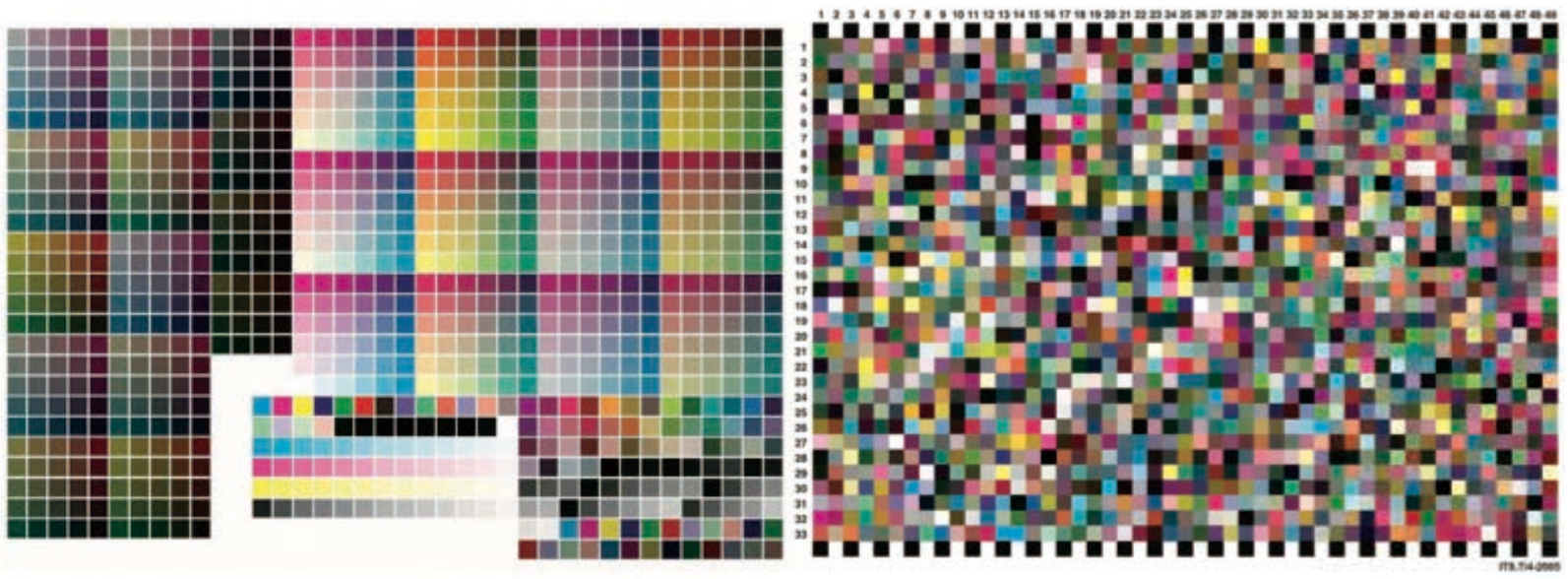
Linearization to the Rescue
維護的線性化

- Need to linearize both stochastic and conventional
- Limitation – plate curve can't change hue of halftones
- Set-up a workflow for each

- 需要為調頻網及調幅網做線性化
- 限制 – 版材曲線不能改變半色調的色相
- 為每個設定設立一個工作流程

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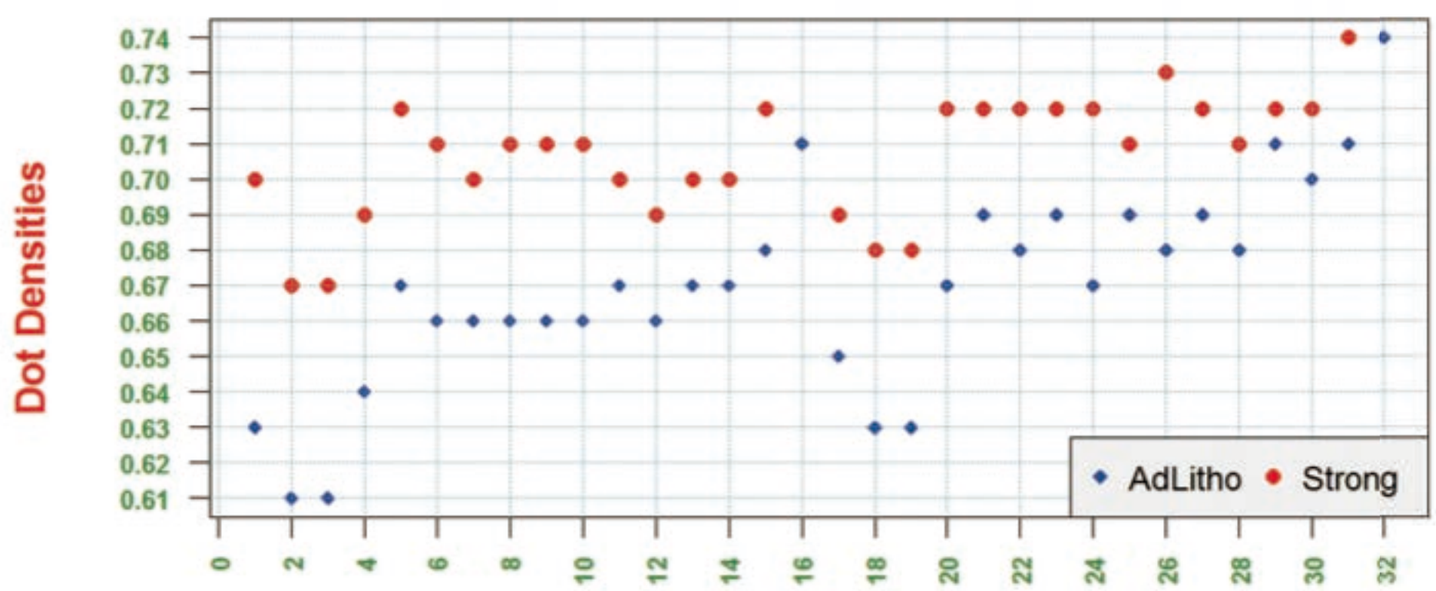
Color Profile: Reduce Press Errors
顏色特性檔：減低印刷錯誤



Why randomize?
為何隨機化？

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Scatterplots for Cyan Densities



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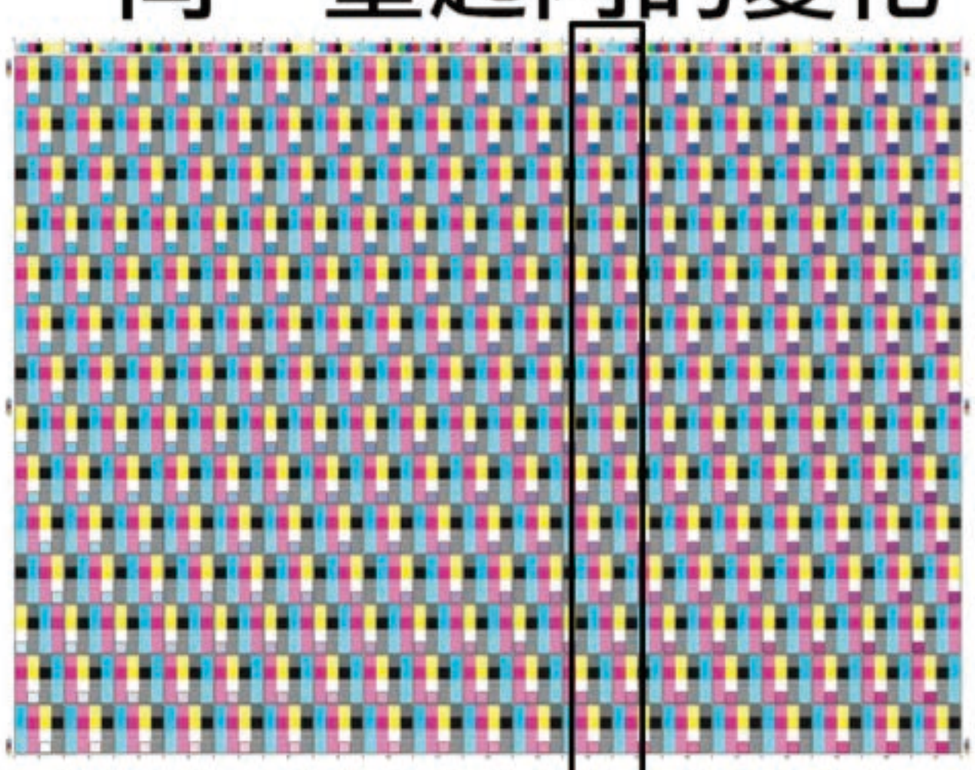
Variation within an ink key zone
一個墨匙內的變化

- It is well known that there is lateral variation in print density due to ink key openings.
- There is also a fair amount of circumferential variation (that is, within a single ink key zone).

- 由於墨匙的開啟，眾所周知，這會產生在印刷密度在橫向的變化
- 這會有一定周的邊變化 (即是在單一墨匙內)

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Variation within an ink key zone
同一墨匙內的變化



Are they all the same color?
它們是否同一顏色？

From presentation by Franz Sigg at TAGA 2007

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Variation within an ink key zone
同一墨匙內的變化

- The maximum variations of the solids were close to 0.08D.

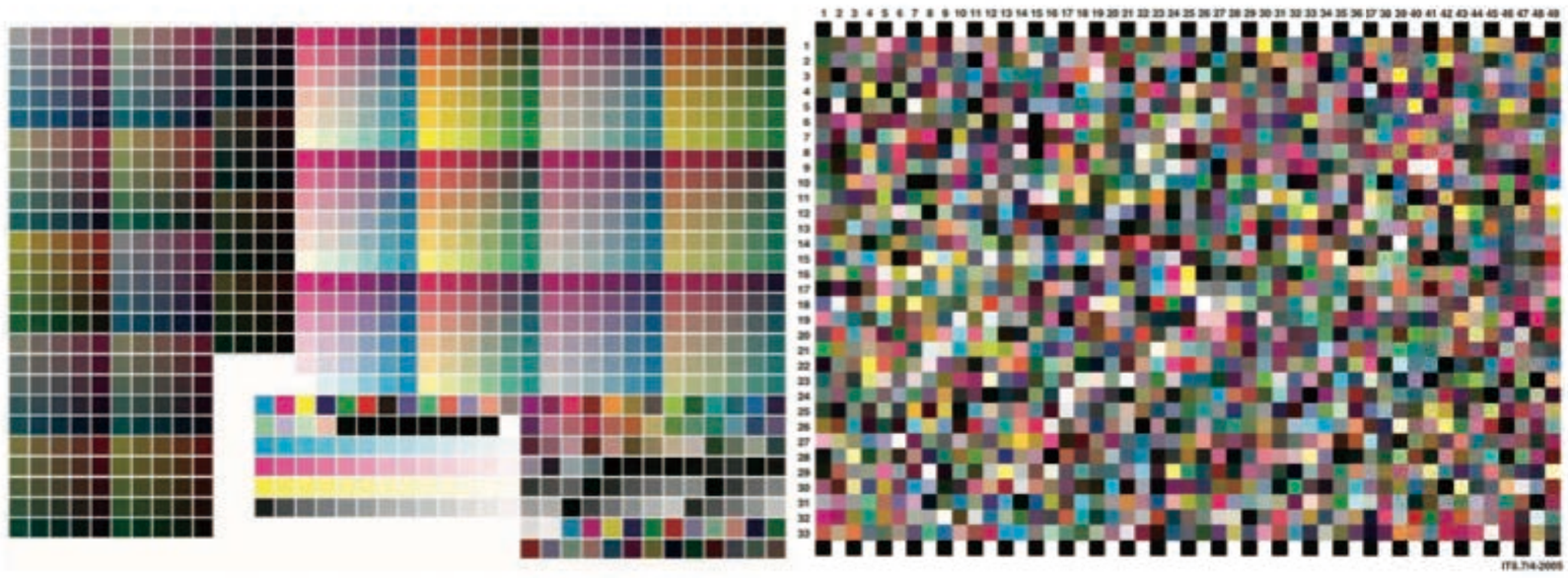
實地色最大的變化是接近 0.08D

Variation within an ink key zone
同一墨匙內的變化

- The variation has a pattern.
- The variation is consistent from one sheet to the next.
- Even with the ink keys set perfectly, there will still be substantial circumferential variation in density.

- 變化是有形態的
- 每張印張的變化是一致的
- 即使墨匙設置理想，密度仍然會有很大的周邊變化

Color Profile: Reduce Press Errors
顏色特性檔：減低印刷錯誤



Randomization gives us an undistorted view of TVI

隨機抽取可以給我們一個真確的 TVI 數據

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Profiling: **Prerequisites**
特性化：先決條件

- Linearized image-setter
  版機線性化
- Calibrated press
  已校正的印刷機
- Repeatable & predictable TVI
  可重覆性及可預測的TVI

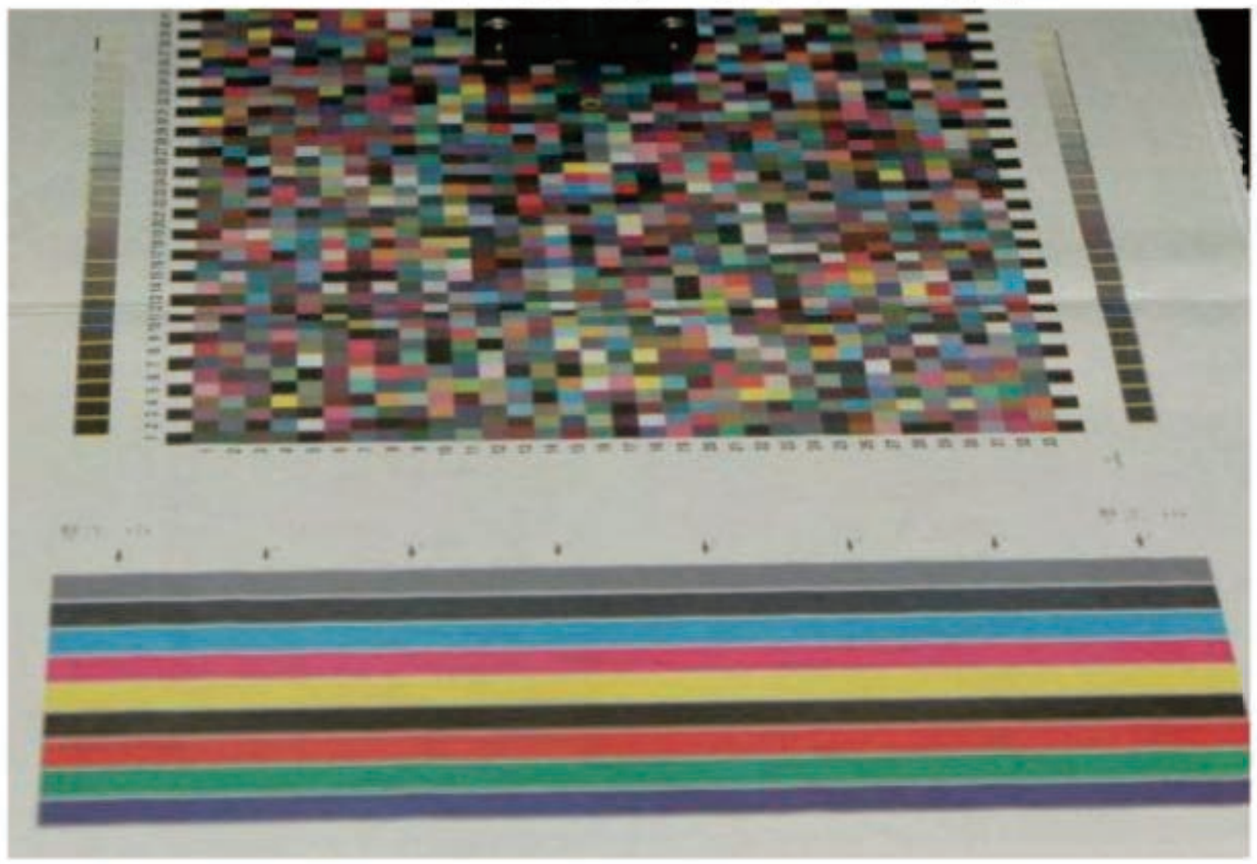
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Color Profile: **Advice**
顏色特性檔：忠告

- Increase total image coverage:
  - Use solid bars across the press
- **Don't** use **photos** in-line with IT8 target
- Avoid creases and mechanical imperfections
- Use reliable measuring device

- 增加總圖像範圍：
  - 使用實色色條橫跨印張
- 不要將相片跟 IT8 測試圖表一併使用
- 避免褶皺及機械性的缺陷
- 使用可靠的量度儀器

IT8 Target with Bars
IT8 測試圖及色條



Summary 總結

- To minimize profiling error:
  - Linearize the image setter
    - You may need multiple linearization workflow
  - Correctly set the ink fountain zero
  - Ensure accurate dampening
  - Determine the system's TVI
  - Randomize the IT8 target
  - Don't use photos along with the IT8 taget
  - Increase ink coverage by using solid bars.

- 減低特性檔的錯誤：
  - 將版材線性化
    - 您可能需要多次線性化工作流程
  - 將墨斗設置正確
  - 確保準確的潤版系統
  - 確定系統的 TVI
  - 隨機抽取 IT8 測試圖
  - 不要將相片與 IT8 測試圖一併使用
  - 使用實地色條以增加油墨之覆蓋

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ICC Color Symposium

13/11/2013 · Hong Kong



Minimizing Profiling Error
減低特性檔錯誤



John Seymour
Principal Engineer - Research, QuadTech

Ragy Isaac
Quality Director, Goss

Organizer

Implementing Agent

Co-organizers

包裝色彩管理流程的挑戰
Challenges in packaging color workflow

包裝色彩管理流程的挑戰



Mr. Steve Smiley
ISO TC130專家/ Smiley Color顧問
ISO TC130 Expert/ Consultant, Smiley Color

Steve在媒體和品牌解決方案方面具有35年資深經驗，通過與眾多主要的消費產品公司的工作，他已經開發出確保在世界各地的品牌的一致性的工具。現在，以他自己的公司 - SmileyColor & Associates - 與CPCs及其供應鏈合作伙伴合作及結盟制定達到ISO標準的流程控制審核。

此前，他在Vertis Communication管理印刷23年，包括數碼印刷、膠版印刷、柔版印刷、凹版印刷。Smiley是IDEAlliance的Print Properties and Colorimetric Committee主席和ISO TC130 WG2, WG3, WG4, WG11以及WG13的美國專家；他曾榮獲Holzinger Award、FTA President Award和Clemson Top Cat Award。

Steve is as 35-year veteran from Pre-Media and Brand Solutions. Working with numerous major consumer product companies, he has developed tools to assure brand consistency throughout the world. Now with his own venture - SmileyColor & Associates - a solutions provider working with CPCs and their supply chain providing process control audits to ISO standards aligning supply chain partners.

Previously, he managed print across Vertis Communications for 23 years - digital, offset, flexo and gravure. Mr. Smiley is Chair of IDEAlliance's Print Properties and Colorimetric committee, US Expert to ISO TC130 WG2, WG3, WG4, WG11 and WG13; He is the recipient of the Holzinger Award, FTA President Award, and the Clemson Top Cat Award.

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ICC Color Symposium

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Challenges in Packaging Color Workflow
包裝色彩管理流程的挑戰

Steve Smiley
SmileyColor& Associates
ISO TC130 Expert

Organizer: The Hong Kong Printers Association 香港印刷業商會

Implementing Agent: APTEC 印刷科技研究中心有限公司 Advanced Printing Technology Centre Ltd.

Co-organizers: ICC; Hong Kong Design Institute 香港知專設計學院

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Packaging includes all products and marketing components
包裝包括所有產品及市場推廣的部份





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- Spirits Packaging:
  - Closures (caps)
  - Cellos / Capsules (tamper evidence)
  - **Labels**
  - Textile Bags
  - Folding Cartons
  - Shippers

"When consumers trust a brand and find it relevant, they may select the offerings associated with that brand over those of competitors, even at a premium price.

"When a brand's promise extends beyond a particular product, its owner may leverage it to enter new markets. For all these reasons, a brand can hold tremendous value, which is known as BRAND EQUITY."*

「當顧客信任一個品牌及感覺它是相關的，即使價錢比競爭者還要高，他們可能都會選擇其相關的產品。」

「當其品牌所承諾的是超越該產品，其品牌擁有者可以以此進入另一個新市場，這個品牌則能具有很大的價值，這稱之為品牌權益。」



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How consumers see brands at retail:
顧客如何看零售店內的品牌：



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How consumers see brands at retail:
顧客如何看零售店內的品牌：



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How consumers see our brands at retail:
顧客如何看零售店內的品牌：



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How consumers see our brands at retail:
顧客如何看零售店內的品牌：



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How consumers see our brands at retail:
顧客如何看零售店內的品牌：



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What we do not want our consumers see our brands at retail:
什麼是我們不想顧客在零售店見到我們的品牌：



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What we do not want our consumers see our brands at retail:
什麼是我們不想顧客在零售店見到我們的品牌：



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AGENDA 議程

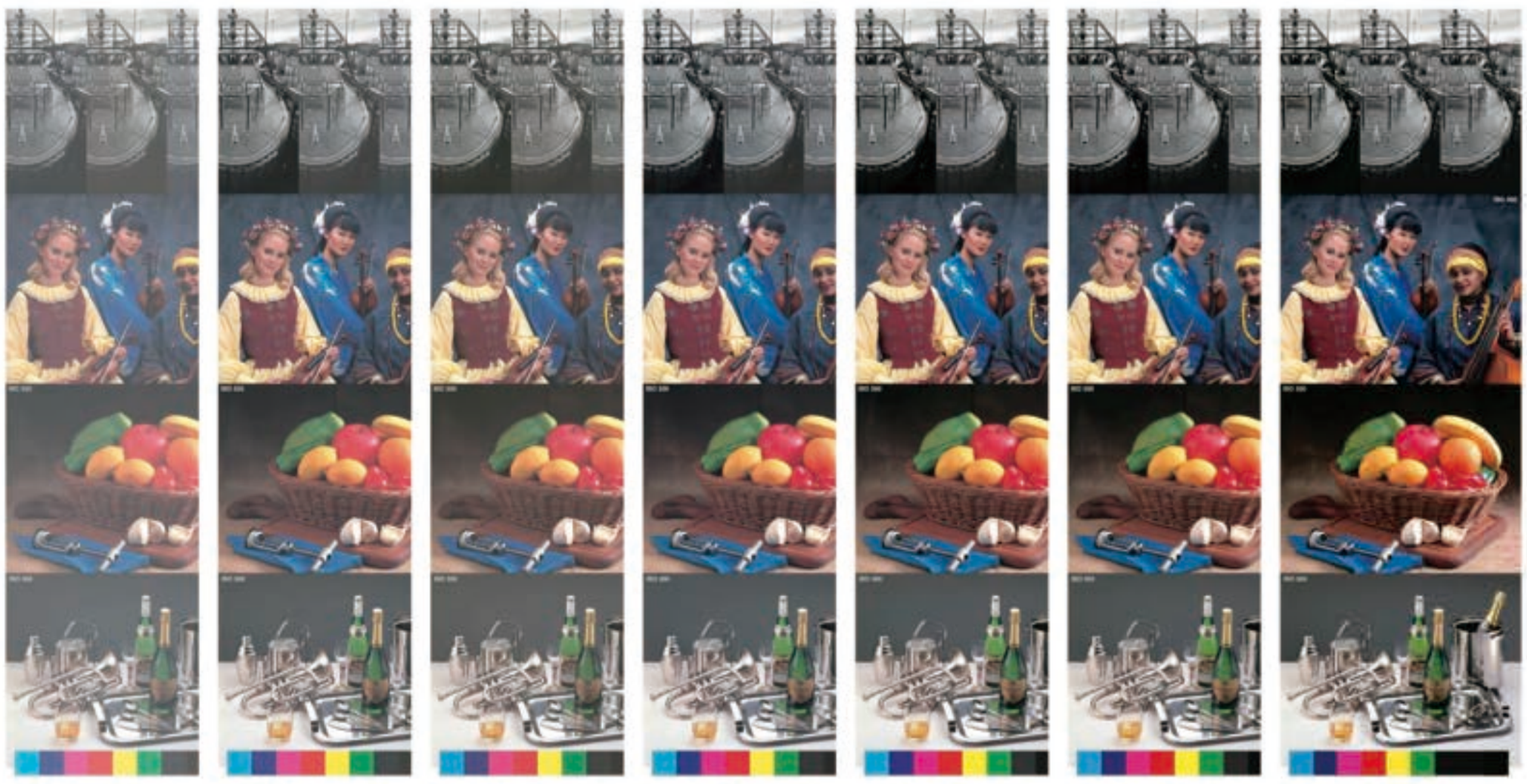
Discuss Challenges in packaging color workflow
探討包裝色彩流程的挑戰

- What are the challenges in packaging printing? CMYK / Spot Colours
  - How does color management and printing standardization help?
- Current Packaging Needs / Challenges
- Workflow color tools
- TS10128 methods
- CxF/X-4 Color Exchange Format - V5 profiles

- 在包裝印刷有什麼挑戰? CMYK / 專色
  - 色彩管理和印刷標準化有何幫助?
- 現時包裝的需要 / 挑戰
- 工作流程的色彩工具
- TS10128方法
- CxF/X-4 色彩轉換格式 – V5 特性檔

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CMYK -ISO 15339, ANSI CGATS 21-2

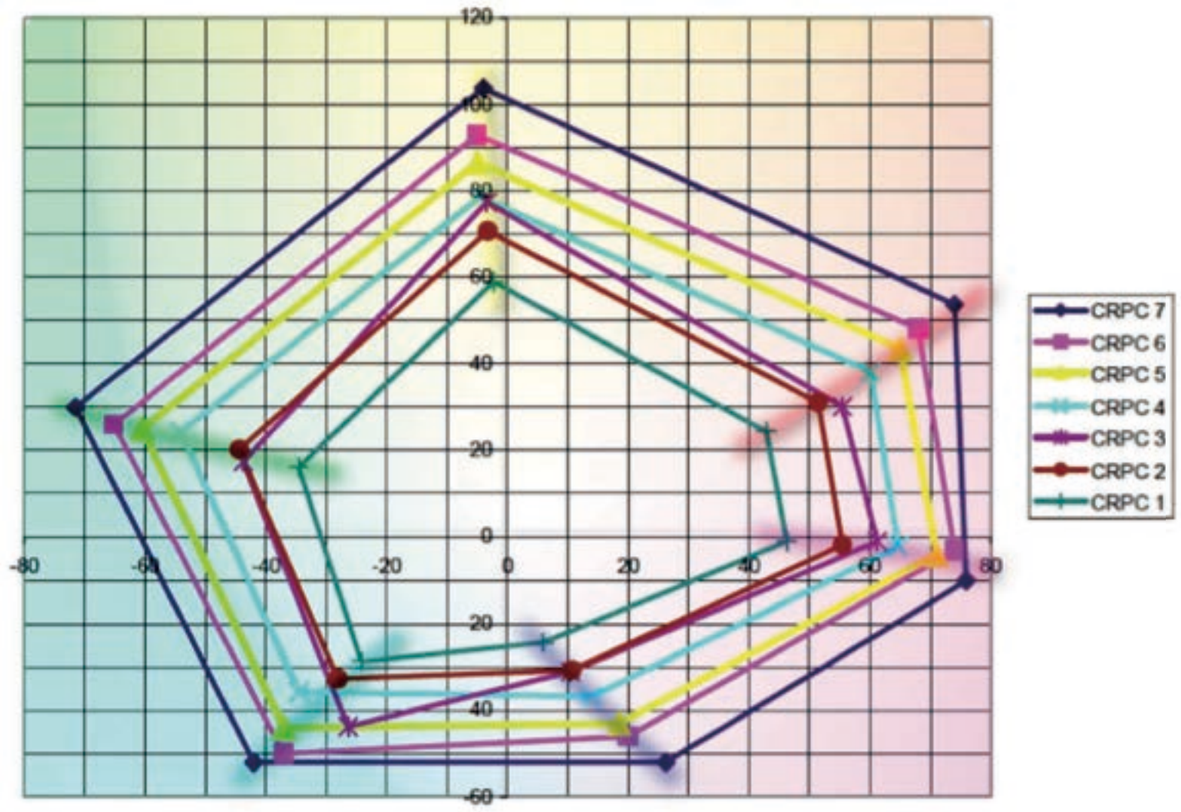


CRPC1 CRPC2 CRPC3 CRPC4 CRPC5 CRPC6 CRPC7

GRACoL UNC 2012 SWOP 2-13 GRACoL2013

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CGATS 21 and ISO15339 Common Appearance with Aligning Hue Angles and G7 Calibration
CGATS 21及ISO 15339 共同外觀，匹配色相角度和G7校正



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Color Management 色彩管理

Press Characterization
印刷特性化

Review of web/sheets
- Visually inspect and choose optimum color charts

檢查印刷機/印張
- 目視檢查和選取適當的色彩測試圖

Measurement/Analysis
- Comparison of data from different zones on the sheet /web for consistency
- Averaging measurements

量度／分析
- 比較印張／印刷機不同位置的數據，以確保一致性
- 平均量度數據

Profile Creation
- Total ink limiting
- Creating multiple separation methods (UCR/GCR)

製作特性檔
- 總油墨的限制
- 建立多個分色方法 (UCR/GCR)



Define Capabilities 定義能力

- Before color management can occur, device stability has to be defined
  在進行色彩管理之前，器材一定要穩定



- Expectations of quality must be defined in the contract in order to hold manufacturer accountable　品質的期望一定要在合約上定義清楚，以保持製造商的責任

CMYK Workflow Solutions
CMYK 工作流程的方法

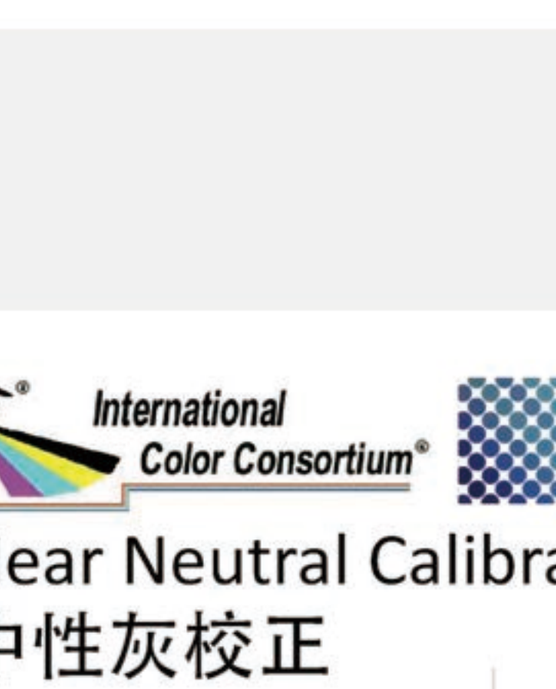
- ISO TS 10128
  - TVI CURVES　階調增大曲線
  - NEAR NEUTRAL CALIBRATION 中性灰校正
    - ANSI CGATS TR015
    - G7
  - ICC COLOR CONVERSIONS　ICC色彩轉換

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TVI Curves 階調增大曲線

- ISO 12647 Series- if appearance is not critical

ISO 12647系列 – 假如外觀是不重要



FINAL DRAFT
INTERNATIONAL STANDARD
ISO/FDIS 12647-2

ISO/TC 130
Secretariat: BAC
Voting begins on: 2013-08-19
Voting terminates on: 2013-10-19

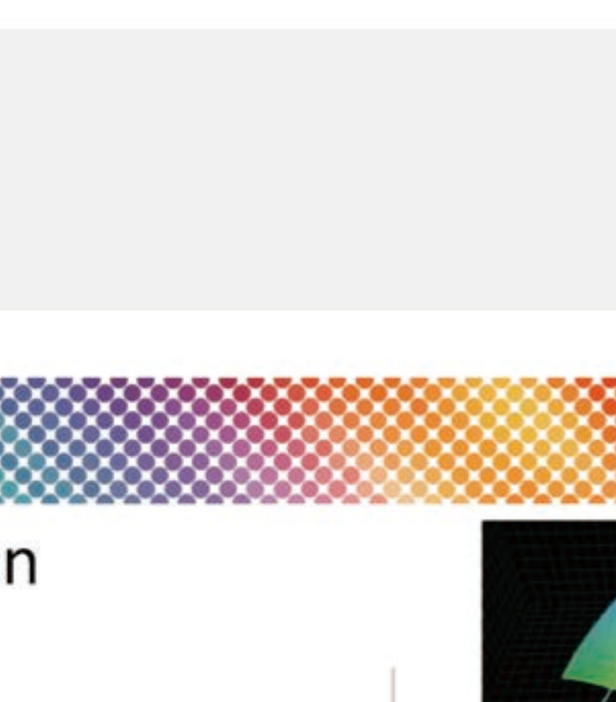
Graphic technology — Process control for the production of half-tone colour separations, proof and production prints —

Part 2:
Offset lithographic processes

Technologie graphique — Maîtrise des procédés pour la fabrication des séparations de couleur en tons trame, des épreuves et des tirages en production —

Partie 2: Procédés lithographiques offset

Reference number
ISO/FDIS 12647-2:2013(E)



ISO/FDIS 12647-2:2013(E)

4.3.3 Tone value reproduction limits

Halftone dot patterns within the following tone value limits in the digital data file should transfer onto the print in a consistent and uniform manner:

a) 2 % to 98 % for coated paper (screen ruling 60 cm^{-1}, spot size 20 µm);

b) 4 % to 96 % for uncoated paper (screen ruling 60 cm^{-1}, spot size 30 µm).

No significant image parts should rely on tone values outside of the above tone value reproduction limits.

4.3.4 Tone value increase and spread

4.3.4.1 Aim values

The tone value increase for printing and press proof prints shall conform to Table 8; see also Figure 3. For calibration purposes Table 9 should be used (see also Notes 5 and 6).

Table 8 — Tone value increase for the control patches of a control strip

Values in percent

Printing condition	Periodic screens				Non-periodic screens			
	40	50	75	100	40	50	75	100
FC1	15	16	13	11	20	20	18	16
FC2, FC3, FC4	19	19	16	12	20	20	18	16
FC5, FC6, FC7, FC8	22	22	16	13	20	20	18	16

NOTE 1 The values given in Table 8 refer to densitometric measurement according to ISO 5-3 in a control strip, with an ISO Status E response, without polarization. Similar results are achievable when using a polarization filter.

NOTE 2 When using standard inks the measurement of TVI using Status T produces results that are close to those produced when using Status E measurements.

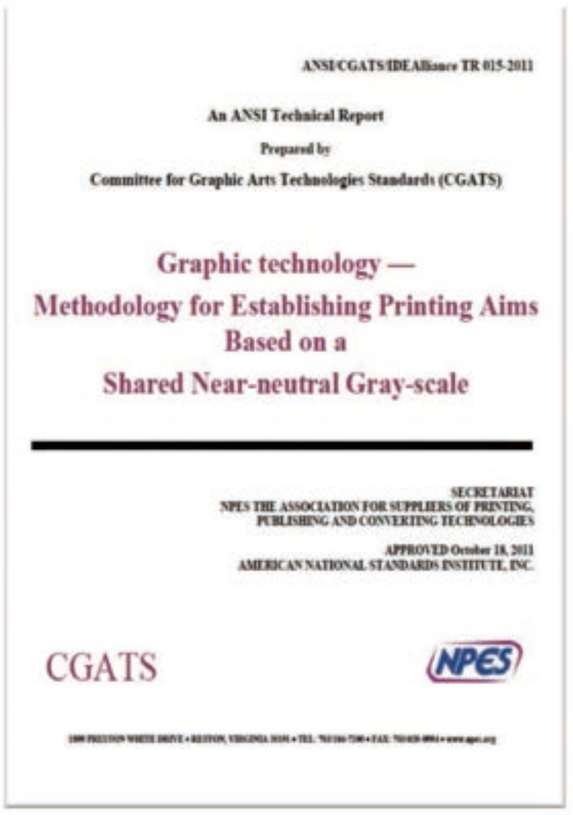
NOTE 3 Given a characterization data set or an ICC profile colorimetric tone values and colorimetric tone value increase values can be calculated. However the concrete values depend on the colour channel and the printing condition and tend to differ from the densitometric tone values. More information on how to link colorimetric toward densitometric tone values can be found in ISO/TS 10128 (see also 4.2.1, fourth paragraph).

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Near Neutral Calibration
中性灰校正

- ANSI CGATS TR015, ISO 15339
- When Color Spaces align with slight differences

當色彩空間有少許的差異



ANSI/CGATS/IDEAlliance TR 015-2011

An ANSI Technical Report

Prepared by

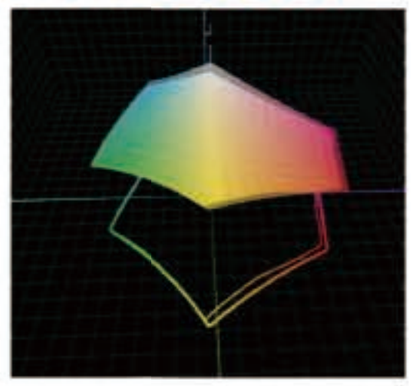
Committee for Graphic Arts Technologies Standards (CGATS)

Graphic technology — Methodology for Establishing Printing Aims Based on a Shared Near-neutral Gray-scale

SECRETARIAT
NPES THE ASSOCIATION FOR SUPPLIERS OF PRINTING, PUBLISHING AND CONVERTING TECHNOLOGIES

APPROVED October 18, 2011
AMERICAN NATIONAL STANDARDS INSTITUTE, INC.

CGATS





ANSI/CGATS TR 015-2011

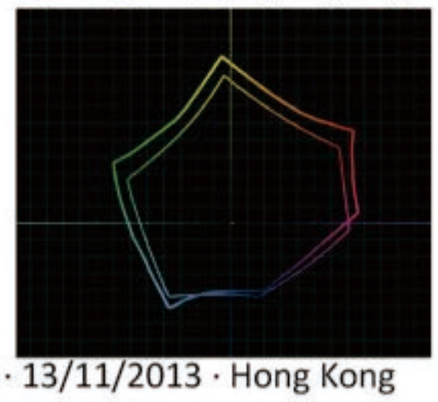
Annex A
(informative)

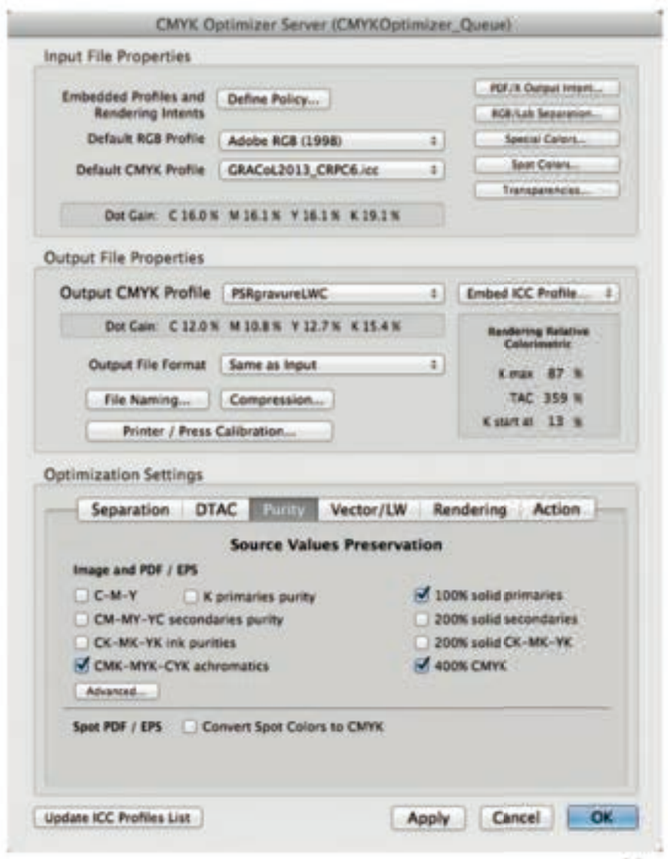
Formulas for TVI curves

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ICC Profile, ICC links
ICC特性檔、ICC裝置連結

- ICC Profiles 4-3-4 transform
  ICC特性檔 4-3-4 轉換
- Using ICC profiles 使用ICC特性檔
  - Keep Pure Colours Pure 保持純色
  - Black only Shadows/Text 黑色只用於暗調 / 文字
  - When Color Spaces do not align using ICC workflow or ICC links with Achromatic Correction 當色域空間不能匹配，可使用ICC工作流程或ICC裝置連結並作出修正





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So How do we Manage Brand Colors?
因此我們如何處理品牌顏色?

Consistency Implies Quality Product - Inconsistency Raises Questions
一致性暗示了高品質產品 – 不一致會引起疑問



Great Packaging delivers a promise about the brand!-"We care about our product"
好的包裝傳遞了一個品牌承諾! –「我們關心我們的產品」

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Spot Color Global Brand Management
環球性的專色品牌管理

- ISO 15976-1:2005 ICC Specification

ICC規格

- ISO 12647-Series

ISO 12647系列

- ISO 12647-6 Flexographic Printing Spot Colour

ISO 12647-6柔版的專色印刷

- ISO 15930 Pre-Press data exchange with PDF

ISO 15930 使用PDF印前數據轉換

ISO TC 130/SC N
Date: 2013-06-21
ISO/CD 17972-4
ISO TC 130/SC /WG 2
Secretariat: DIN

Graphic Technology — Colour data exchange format (CxF/X) — Part 4: Spot colour characterisation data (CxF/X-4)

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Brand Colour Development
品牌顏色制定

- Ideation 構思
- Develop Colour Program
  制定色彩的計劃
- Clear tool for correct
  修正的工具
- Sequence of INKS 油墨印序
- Ink Opacity 油墨的不透明度
- Substrate Opacity 承印物的不透明度



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Current Challenges 現時的挑戰

- Brand Equity
- Consistency
  - Across Substrates and Supply chain Partners
- Brand Management
- Workflows
  - Esko/Artworks
  - Prinergy/Kodak
  - Agfa
  - GMG / CGS / EFI
  - PDFs inability to accept N-color Profiles
- ICC workflow using special colors

- 品牌權益
- 一致性
  - 不同承印物及供應鏈的合作伙伴
- 品牌管理
- 流程系統
  - Esko/Artworks
  - Prinergy/Kodak
  - Agfa
  - GMG / CGS / EFI
  - PDFs 不能接受多色特性檔
- 使用特別色的ICC流程

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Packaging Challenges 包裝的挑戰

White shaded 漸變至白
- Blue to yellow 藍至黃
- White point compensation 白點補償
- OBA (Fade due to process) 螢光劑

Metallic substrates 金屬色的承印物
- Transparent or Opaque inks 透明或不透明油墨
- Inks due vary 油墨引致變化

Clear substrates 透明的承印物
- Backing 背景
- Gloss/ Reflection 光澤／反射
- Reverse or surface print 反轉或正面印刷



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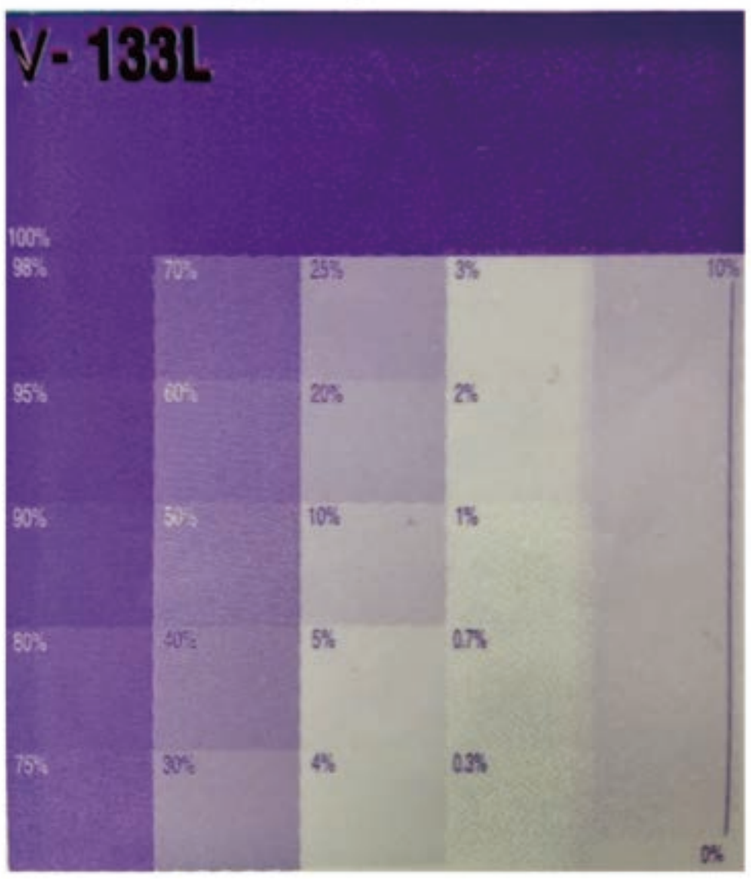
Additional issues... 其他問題

- Light shaded colors
  - Minimal DE shift with huge visual shift
  - Dot control
- Ink formulation was metameric
  - Formulated with opaque instead of transparent ink
  - Proves need for ink & QC control
- Printing on metallic substrates & metallic inks
  - Measuring color is challenging
  - Appearance due to sheet surface
- Predicting color shifts when introducing clear laminates

- 淺顏色的漸變
  - 最低的色差，但有很大的視覺偏離
  - 點的控制
- 油墨配方是同色異譜的
  - 以不透明取替透明油墨配方
  - 證明油墨及品質控制的需要
- 印在金屬物料上及使用金屬油墨
  - 量度顏色是具挑戰性
  - 外觀會受物料的表面影響
- 預測使用透明過膠的顏色偏差

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Highlight Dots 光位的網點 (or the lack of)



File setup & tonality is process specific

- Litho and some digital we can use a 0% to 100% scale
- Flexo and gravure we have to define minimum dot.

Hazards

- Matching across processes
- Matching printer-to-printer
- Break zone
  - Highlight dots print followed by a void, the back to printing

檔案設置及階調是根據流程而設定

- 柯式及數碼印刷，我們可以使用0%至100%的階調
- 柔版及凹版，我們需要定義最細的網點

風險

- 不同的流程之匹配
- 印刷商與印刷商之匹配
- 打破區域
  - 光位的網點有問題，需反覆印刷

Colorants & Gamut 顏料及色域

Challenges

- Some processes are prone to color contamination
- Process and substrate control gamut
- Ink trapping can be unpredictable or impacted by mechanics

Resolutions

- Work in the largest gamut as possible
  - RGB or CMYK or N-channel
- Device link profiles
- Know how to identify contamination
- Trial runs

挑戰

- 有些流程是會引致顏色有污染
- 流程和承印物控制色域
- 油墨疊印是不能預測或會受機件而影響

解決方法

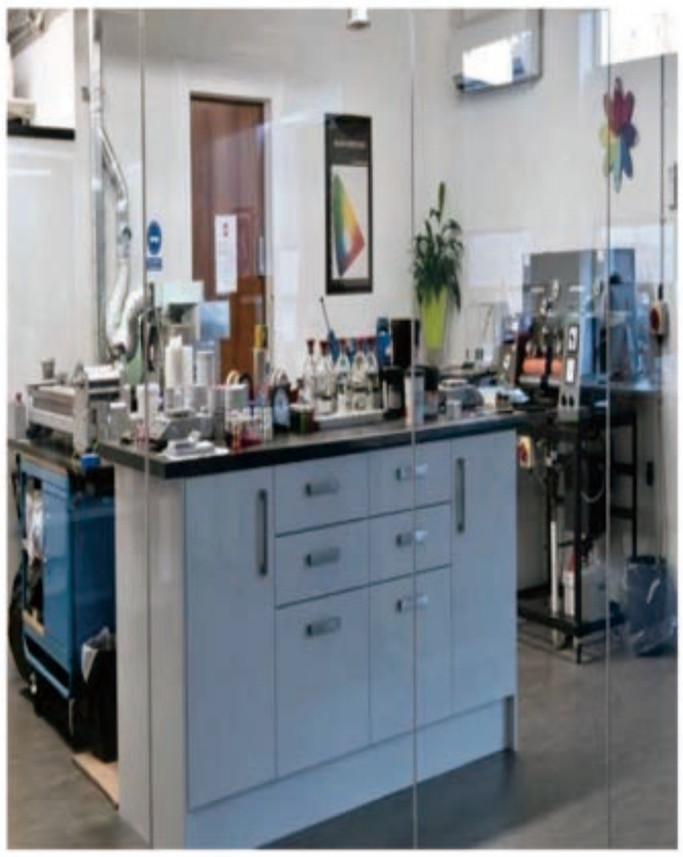
- 儘量使用最大的色域
  - RGB或CMYK或多色
- 使用裝置連結特性檔
- 知道如何識別污染
- 試印







Color Development 顏色研發



Color matching challenges

- Ink formulations are not the same & subject to interpretation.
- Pigment sourcing by print process maybe different.
- Ink suppliers use different mixing systems.
- Producing a color that matches on difference substrates may requires consideration.
- The ability to communicate metameric conditions is a must.

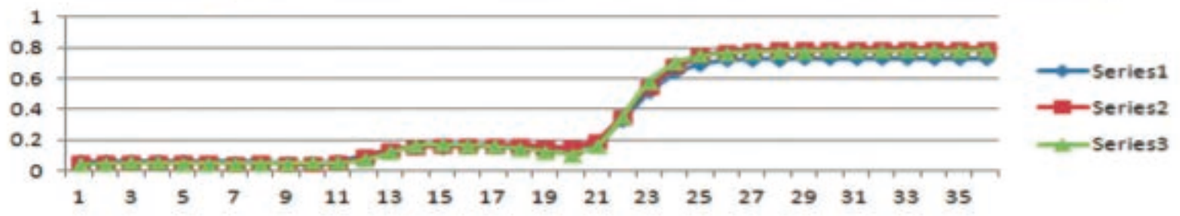
顏色匹配的挑戰

- 油墨配方並非相同，以及取決於不同的演譯
- 顏料的選擇會因印刷過程而有所不同
- 油墨供應商使用不同的混合系統
- 要產生一種顏色去匹配不同的承印物需要考慮多個因素
- 能與同色異譜的環境配合是必須的

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Careful Planning Can Produce Excellent results across multiple print platforms
小心地計劃便能在不同的印刷方法中產生最佳效果





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Overview 概覽

The typical job... 典型的工作 ...

- Design handoff 設計
- Pre-engineering 工作策劃
- Color development 色彩構思
- Proofing/prototyping 打稿
- File creation/development 檔案製作
- Press Run Approval 印刷批核



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ISO 12647-6

- Packaging Standards
  包裝標準
- Match Customer Expectation using Reference Printing Conditions
  使用印刷條件參考文件以匹配客戶的期望
- Spot Colour Alignment with TVI or CxF/X-4
  運用 TVI 或 CxF/X-4 的專色配合


INTERNATIONAL STANDARD **ISO 12647-6**

Second edition
2012-12-15

Graphic technology — Process control for the production of half-tone colour separations, proofs and production prints

Part 6:
Flexographic prin

Technologie graphique — Contr
sélections couleurs tramées, d'ép

Annex A
(informative)

Communication of spot colour data

spot colour is a non-process colour that is used in addition to, or in place of, a process colour, where th
ointent appearance of that colour produced is critical to the appearance of the finished product or th
ea coverage of that colour dictates the use of a single ink. It is normally applied with a single impression
ess associated with a corporate product identity, a spot colour is also known as brand colour.

ere spot colours are used, they need to be defined by spectral reflectance measurement data of the
ot colour ink printed over the substrate to be used for printing (or a reference substrate similar to
r actual substrate to be used) and over a black area printed on this substrate (the adhesion or tra
the ink over the black can result in a different ink transfer and hence film weight than when printin
or the unprinted substrate). Spot colours incorporating tints need to be defined at a minimum wit
nts on the substrate and on the printed black area at tone values of 0 [%], 50 [%] and 100 [%]. Spo
ours incorporating tints are better defined with prints on the substrate and on the printed blac
ea with at least 9 tone values that include a 0 [%], 50 [%] and 100 [%] tone value and are otherwise
rely distributed in tone value between the substrate and the solid (unless otherwise agreed between
vider and receiver, colour measurements are made as defined in ISO 13655, condition M1, over
ate backing.

e substrate ideally is the substrate on which the job will be printed. The black ink needs to be printe
the standard L^* value ($L^* \leq 11$). A commercial "contract card" can be used where the actual printing
strate is not known or available.

e measurement data file needs to include the model of measurement instrument used, the printing
ocedure, ink identification, and substrate used.

ISO 17972-4, *Graphic technology — Colour data exchange format — Part 4: Spot colour characterization data*
4:20-4) which is under development will in future facilitate the communication of spot colour dat

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ISO 17972-4 - CxF X4 Spot Colours

From Design through Print Consistency 由設計至印刷的一致性
Utilizing PDF X as the document to carry CXF X4 data 使用PDF X記載著CXF X4數據

Objectives



Designers can create a printable product that meets the brand requirements for colour



Design can be proofed accurately on monitor or on hard copy proof



Package (or other product) can be printed as the designer intended

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CxF/X-4 Scope CxF/X-4 範圍

Graphic Technology — Colour data exchange format (CxF/X) — Part 4: Spot colour characterisation data (CxF/X-4)

1 Scope

This part of ISO 17972 defines an exchange format for spectral measurement data of inks to provide a means to characterise spot colour inks to allow reliable printing and proofing of products that have been designed using these inks.

This document describes the use of a CustomResource element within the CxF framework to define a minimum and recommended set of data for exchange.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17972-1 Graphic technology — Colour data exchange format (CxF/X) — Part 1: Relationship to CxF3 (CxF/X)

This document also assumes familiarity with the concepts and terminology used when describing XML and CxF.

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ISO 17972-4

- CxF/X-4 Print Requirements
  CxF/X-4的印刷要求

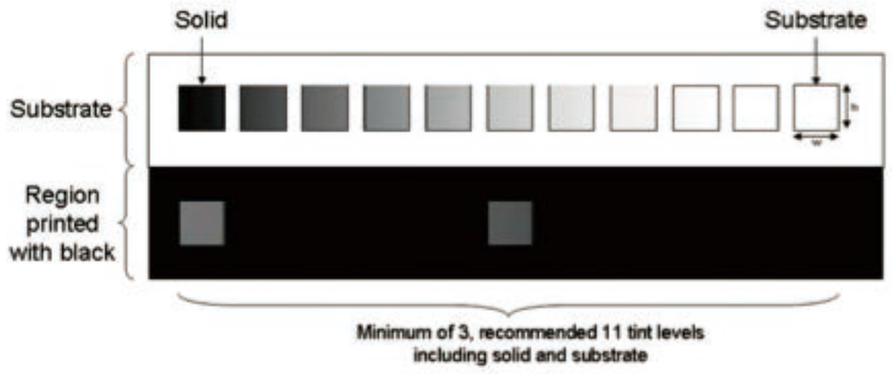
ISO/CD 17972-4.2

5 Requirements

5.1 Characterisation chart preparation

5.1.1 General

Measurement data in a conforming CxF/X-4 file should be taken from a spot ink characterisation chart as shown in the figure below. This measurement data provides the characteristic colour response for the combination of ink and substrate.



ISO 17972-4

- CxF/X-4 Requirements CxF/X-4 要求

ISO/CD 17972-4.2

For conformance level CxF/X-4 a second set of patches shall be printed on the region printed with black ink. This set of patches shall include 0 %, 50% and 100% tint levels.

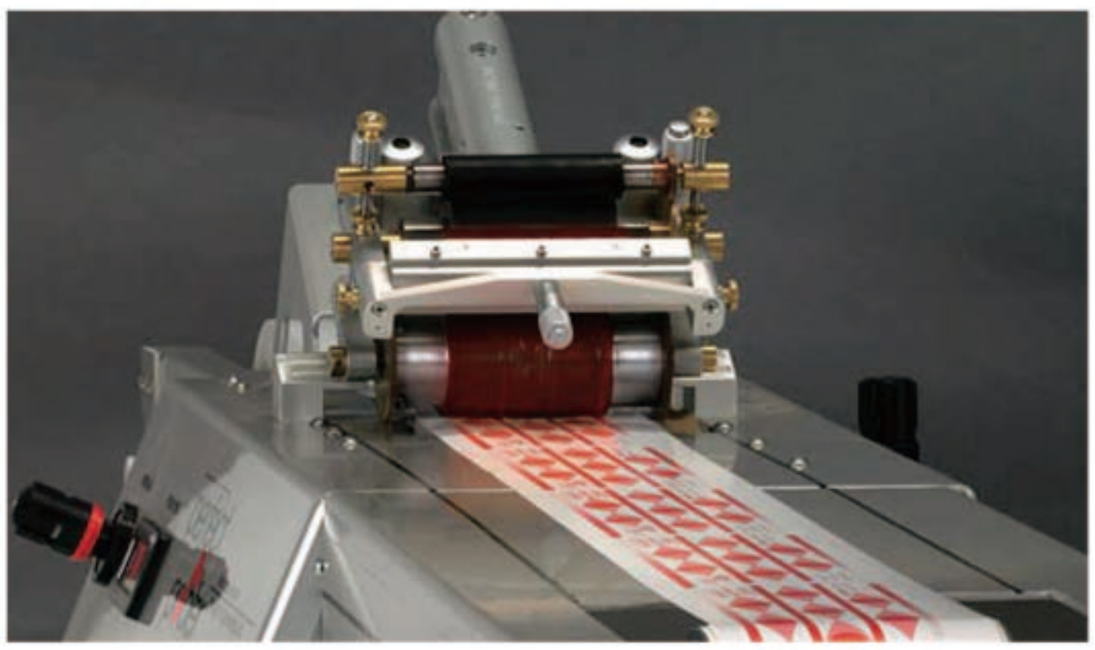
The patch width (w) and height (h) shall be large enough to measure.

The only difference in the ink characterisation data files for these conformance levels is the number and type of measurements required and this is shown in Table 1 below.

Type of measurement	CxF/X-4	CxF/X-4a	CxF/X-4b
Solid ink printed on substrate	Required	Required	Required
Tints of ink printed on substrate	3 minimum, 11 recommended	3 minimum, 11 recommended	No requirement
Tints of ink printed on black background	3 minimum	No requirement	No requirement

Brand Management 品牌管理

- Developing Colour to align with CPC (Consumer Products Company) requirement
  構思顏色要與 CPC 要求配合





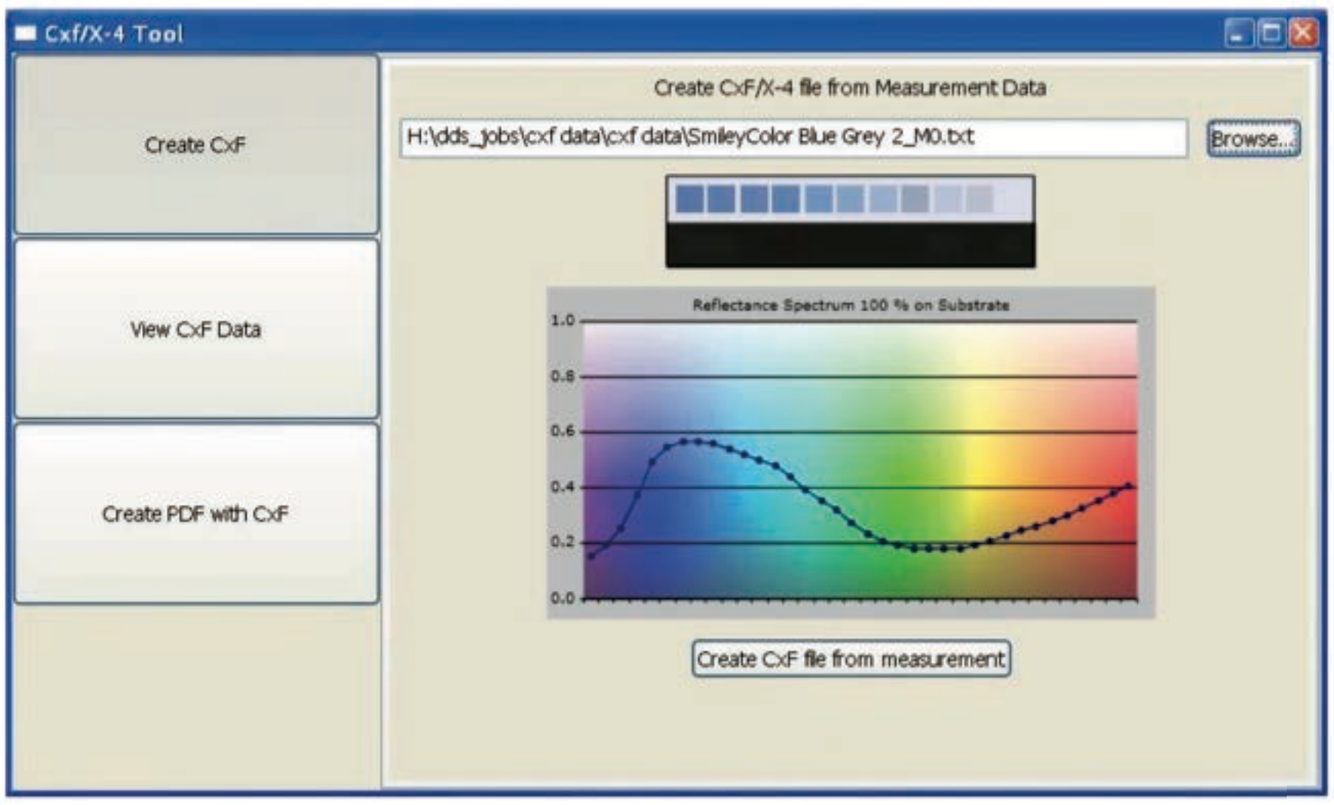
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ANSI.txt

| | | |

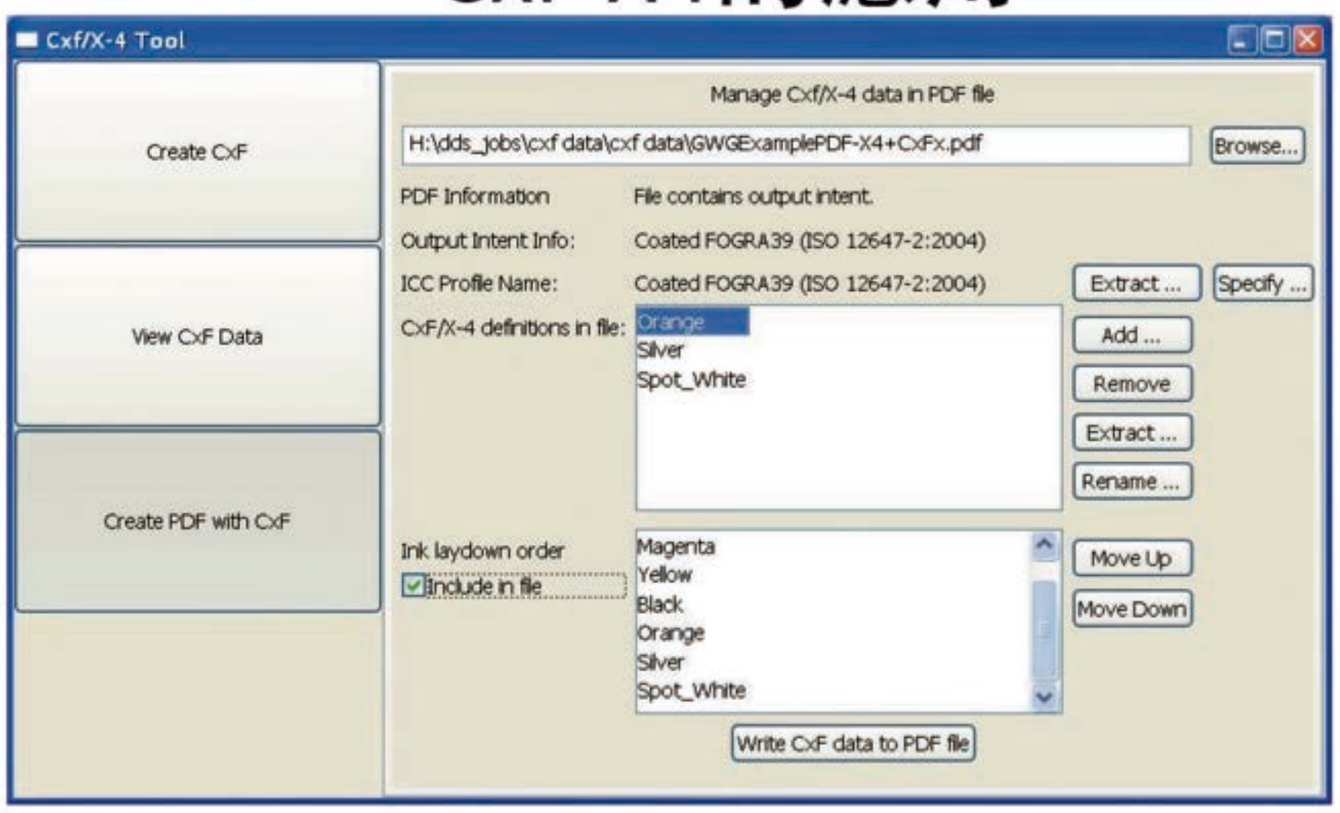
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CxF/X-4 Toolbox
CxF/X-4 工具箱



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CxF X4 Application
CxF X4的應用



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CxF X4 format
CxF X4的格式


```
– <cc:CxF xsi:schemaLocation="http://colorexchangeformat.com/CxF3-core CxF3_Core.xsd">
  – <cc:FileInformation>
      <cc:Creator>GWG Demo Creator</cc:Creator>
      <cc:CreationDate>2011-03-21T15:40:00-05:00</cc:CreationDate>
      <cc:Description>White ink characterisation for GWG demo</cc:Description>
    </cc:FileInformation>
  – <cc:Resources>
    – <cc:ObjectCollection>
      – <cc:Object ObjectType="Standard" Id="A1" Name="A1">
          <cc:CreationDate>2011-03-21T15:40:00-05:00</cc:CreationDate>
        – <cc:ColorValues>
          – <cc:ReflectanceSpectrum ColorSpecification="CS001">
              0.7256 0.7733 0.8060 0.8292 0.8470 0.8632 0.8764 0.8872 0.8963 0.9004 0.9027 0.9038 0.9022 0.8999 0.8953 0.8886 0.8919 0.8997 0.8965 0.8910 0.8830 0.8795 0.8771 0.8775 0.8824 0.8907 0.9031 0.9145 0.9240 0.9273 0.9260 0.9239
              0.9258 0.9300 0.9336 0.9396
            </cc:ReflectanceSpectrum>
          </cc:ColorValues>
        </cc:Object>
      – <cc:Object ObjectType="Standard" Id="A2" Name="A2">
          <cc:CreationDate>2011-03-21T15:40:00-05:00</cc:CreationDate>
        – <cc:ColorValues>
          – <cc:ReflectanceSpectrum ColorSpecification="CS001">
              0.0161 0.0146 0.0143 0.0135 0.0133 0.0129 0.0125 0.0122 0.0120 0.0117 0.0114 0.0113 0.0112 0.0109 0.0106
              0.0083 0.0082 0.0081 0.0081
            </cc:ReflectanceSpectrum>
          </cc:ColorValues>
        </cc:Object>
      – <cc:Object ObjectType="Standard" Id="B1" Name="B1">
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        – <cc:ColorValues>
          – <cc:ReflectanceSpectrum ColorSpecification="CS001">
              0.6305 0.6846 0.7492 0.8140 0.8480 0.8665 0.8791 0.8896 0.8986 0.9023 0.9045 0.9059 0.9044 0.9019 0.8973
              0.9262 0.9301 0.9336 0.9396
            </cc:ReflectanceSpectrum>
```

```
  – <cc:CustomResources>
    – <sic:SpotInkCharacterisation SubstrateName="Steve's substrate" SpotInkName="White" InventoryID="Ink_327
      – <sic:MeasurementSet Background="Substrate">
          <sic:Measurement TintLevel="0.0" ObjectRef="A1"/>
          <sic:Measurement TintLevel="10.0" ObjectRef="B1"/>
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          <sic:Measurement TintLevel="40.0" ObjectRef="E1"/>
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          <sic:Measurement TintLevel="60.0" ObjectRef="G1"/>
          <sic:Measurement TintLevel="70.0" ObjectRef="H1"/>
          <sic:Measurement TintLevel="80.0" ObjectRef="I1"/>
          <sic:Measurement TintLevel="90.0" ObjectRef="J1"/>
          <sic:Measurement TintLevel="100.0" ObjectRef="K1"/>
        </sic:MeasurementSet>
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          <sic:Measurement TintLevel="50.0" ObjectRef="F2"/>
          <sic:Measurement TintLevel="60.0" ObjectRef="G2"/>
          <sic:Measurement TintLevel="70.0" ObjectRef="H2"/>
          <sic:Measurement TintLevel="80.0" ObjectRef="I2"/>
          <sic:Measurement TintLevel="90.0" ObjectRef="J2"/>
          <sic:Measurement TintLevel="100.0" ObjectRef="K2"/>
        </sic:MeasurementSet>
      </sic:SpotInkCharacterisation>
    </cc:CustomResources>
</cc:CxF>
```


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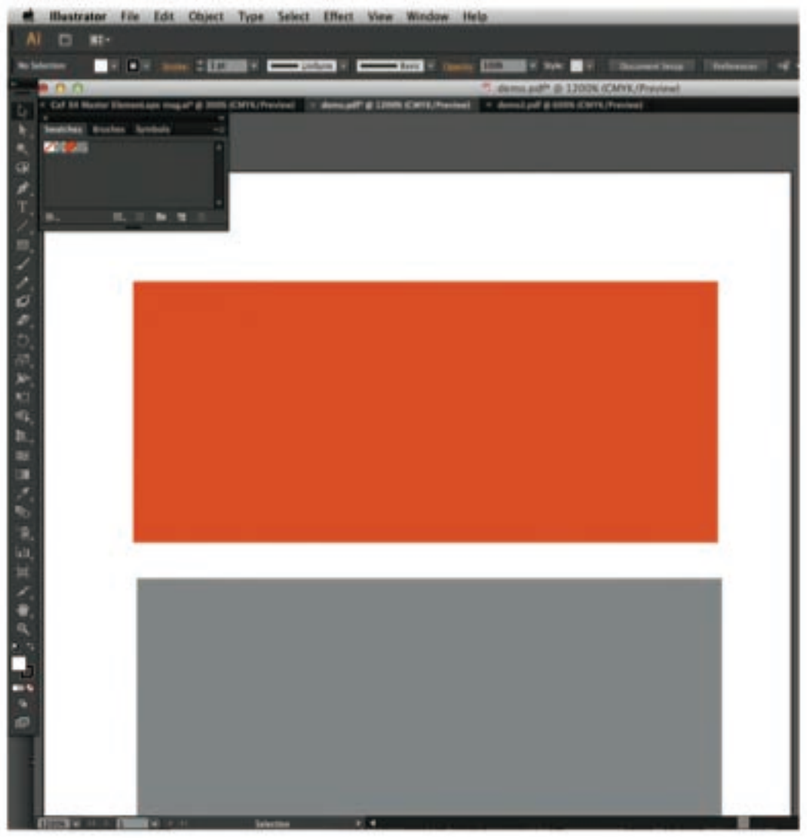
Import CxF/x4 Data to Illustrator
將 CxF/x4 數據輸入 Illustrator





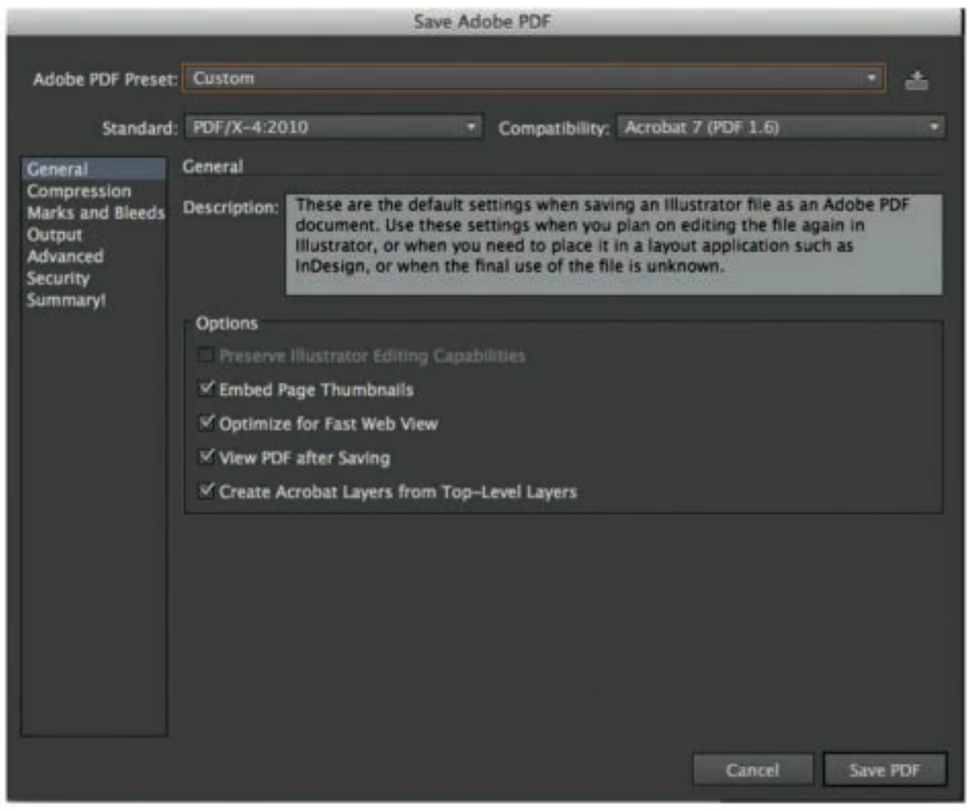
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CxF/X4 in Adobe Illustrator
Adobe Illustrator 內的 CxF/X4



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Save as Adobe PDFX-4
儲存成 Adobe PDFX-4



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Adobe® Acrobat® XI
Version 11.0.03

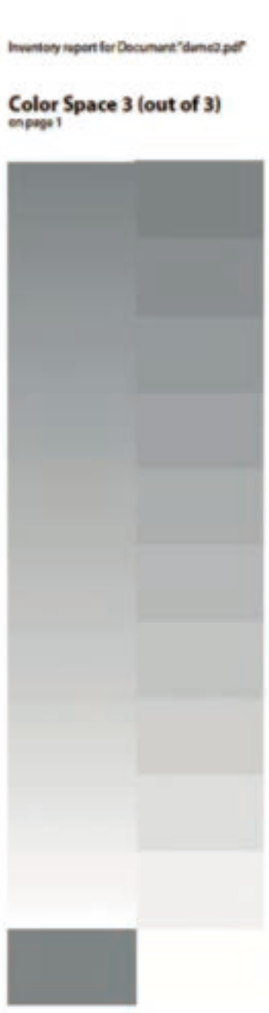
PDF X4 Output
PDF X4 輸出



Inventory report for Document:"demo2.pdf"

Color Space 2 (out of 3)
on page 1

Color Space properties:
Separation color space: "Orange (CXFX)" Lab (ICC) (60.29/62.38/69.67)
Color name: Orange (CXFX)
Alternate color space
ICC based color space: "Lab D50"
Components range (0.0/1.0/0.0/1.0/0.0/1.0)
Number of color components: 3
Alternate color space
Lab color space
Diffuse white point
0.964
1.0
0.825
Diffuse black point
0.0
0.0
0.0
Components range
-128.0
127.0
-128.0
127.0
ICC profile data
Profile version number: "2.1.0"
Color Management Module (CMM) type: "ADBE"
Profile/Device class signature: "spac"
Color space of data: "Lab "
Profile Connection Space (PCS): "Lab "
Magic number: "acsp"
Primary Platform: "Apple Computer, Inc. (APPL)"
Device manufacturer: "none"
Device model: ""
Profile creator: "Adobe Systems Incorporated (ADBE)"
Creation date: "6/3/99 12:00 AM"
Default rendering intent: Perceptual
Profile illuminant
Illuminant X: 0.964
Illuminant Y: 1.0
Illuminant Z: 0.825
Copyright information: "Copyright 1999 Adobe Systems Incorporated"
Profile description: "Lab D50"
Profile ID (MD5 hash):
"BC759FE4D6C84997D34103C1141964DA"



Inventory report for Document:"demo2.pdf"

Color Space 3 (out of 3)
on page 1

Color Space properties:
Separation color space: "Silver (CXFX)" Lab (ICC) (60.83/-0.83/-1.83)
Color name: Silver (CXFX)
Alternate color space
ICC based color space: "Lab D50"
Components range (0.0/1.0/0.0/1.0/0.0/1.0)
Number of color components: 3
Alternate color space
Lab color space
Diffuse white point
0.964
1.0
0.825
Diffuse black point
0.0
0.0
0.0
Components range
-128.0
127.0
-128.0
127.0
ICC profile data
Profile version number: "2.1.0"
Color Management Module (CMM) type: "ADBE"
Profile/Device class signature: "spac"
Color space of data: "Lab "
Profile Connection Space (PCS): "Lab "
Magic number: "acsp"
Primary Platform: "Apple Computer, Inc. (APPL)"
Device manufacturer: "none"
Device model: ""
Profile creator: "Adobe Systems Incorporated (ADBE)"
Creation date: "6/3/99 12:00 AM"
Default rendering intent: Perceptual
Profile illuminant
Illuminant X: 0.964
Illuminant Y: 1.0
Illuminant Z: 0.825
Copyright information: "Copyright 1999 Adobe Systems Incorporated"
Profile description: "Lab D50"
Profile ID (MD5 hash):
"BC759FE4D6C84997D34103C1141964DA"

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More Spot Color Overprint
更多專色疊印

Prediction

- Current proofing system use Spectral data to correctly predict overprint
- Not consistent based on technologies or printers

All the information across the supply chain!

預測

- 現時的打稿系統使用光譜數據去正確預測疊印
- 基於技術及打印機，不能達到一致

所有資料橫跨整個供應鏈!

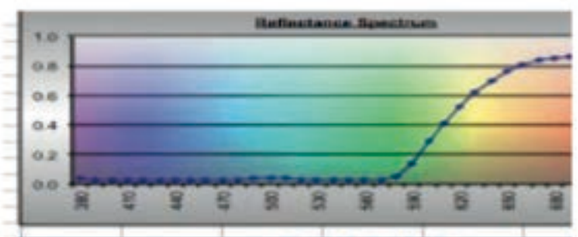


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Contract Proofing & Comps
合約打稿及色版

- Soft or hard comp proofing tool
- Providing spectral aims for spectral blending applications
- Using tint ramp defined provides Lab proofing aims

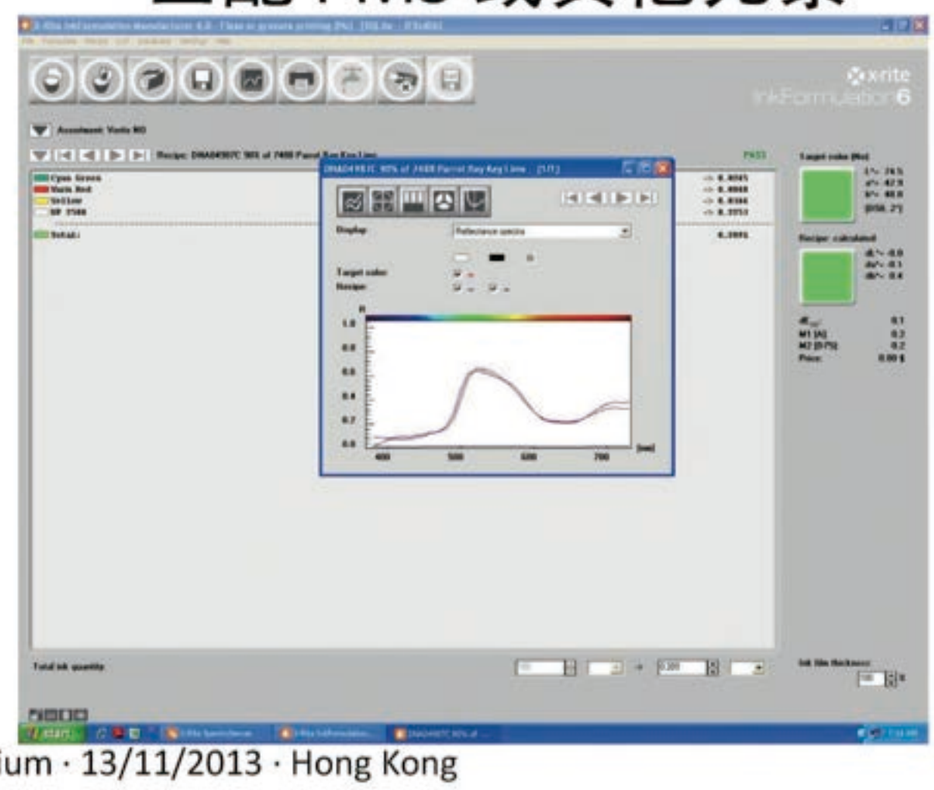
- 軟或硬色版工具
- 為光譜軟件提供光譜目標值
- 使用平網深淺去定義打稿的 Lab 目標值



Spot Over White					
Dot %	L	a	b	C	H
0	94.23	0.21	0.33	0.39	
10	88.09	5.74	1.72	6.00	
20	83.12	10.56	3.09	11.00	
30	77.86	15.93	4.87	16.66	
40	72.08	22.24	7.14	23.35	
50	66.18	29.41	10.17	31.12	
60	60.56	36.71	13.83	39.22	
70	54.50	44.86	18.84	48.66	
80	49.47	53.45	26.00	59.44	
90	47.54	57.40	31.05	65.26	
100	42.97	64.11	40.38	75.77	

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Ink Formulation – CxF X4 development
Matching PMS or other element
油墨配方－CxF X4發展
匹配 PMS 或其他元素





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Soft proofing Spot Color Overprint
軟打稿專色疊印

Accurate Prediction

- Current soft proofing system use Spectral data to correctly predict overprint
- Aligning Tints and overprints

準確預測

- 現時的軟打稿使用光譜數據準確地預測疊印
- 配合平網及疊印



All the information across the supply chain delivered with PDFX and CxF data

所有跨越供應鏈的資料都以PDFX及CxF數據作傳送

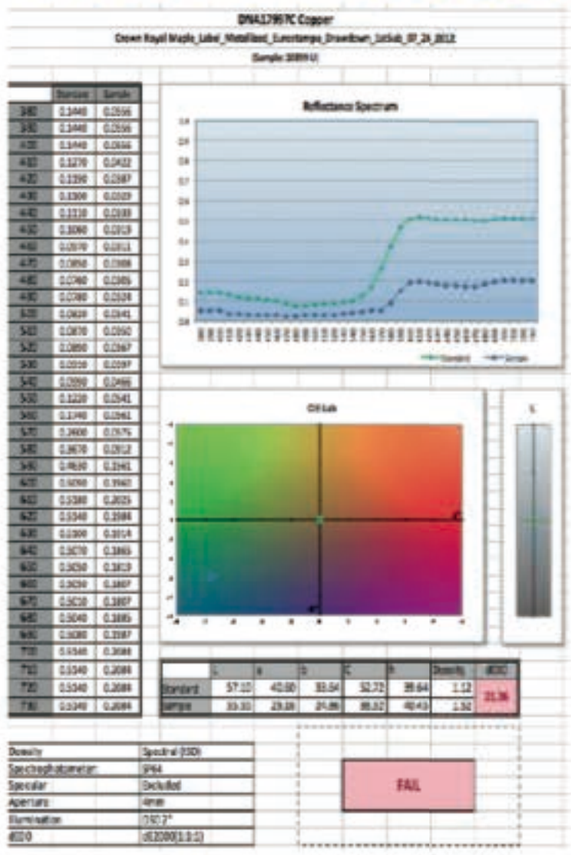
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Printer Ink Approval Process
印刷油墨的核實過程

- Inks are developed to the defined spectral data –
- Customer Tolerances

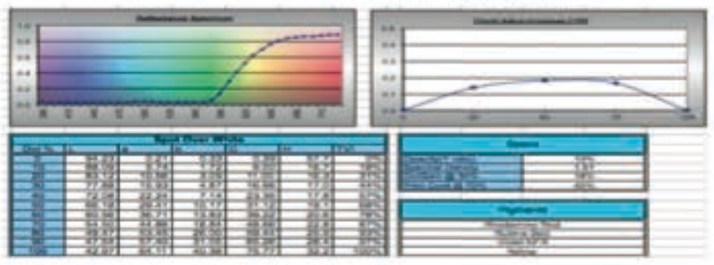
- 油墨制定至定義的光譜數據－
- 客戶的寬容度





TVI curves define aims to be are in to Image Carrier – or communicated to digital rip

TVI 曲線定義了圖像載體的目標值－或與RIP進行溝通



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Keep Printers Consistent
維持印刷機一致性

Understand expectations

- If doing brand work, consistency is the game.
- 95% of failures are the inability to get back to targeted print condition and/or raw material changes.
- Define tolerances & ensure operators understand QC
- Work with printers to minimize variables
  - Mechanics, ink dynamics, surface energy/ transfer
- Dot control (expanded gamut)

了解期望

- 如果要做有關品牌的工作，就需要考慮一致性
- 95% 的不達標是由於不能回復目標印刷的狀態以及／或物料的改變
- 定義寬容度以及確保操作員明白品質管理
- 與印刷商一起去減低變數
  - 機械、油墨動態、表面能量／轉移
- 網點控制（擴大色域）



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What to Measure & Meaning
要量度什麼和其意義

Targets

- Defined by the Std. or Spec.
- Measurement method has to be specified
- Some brands specify equipment

目標

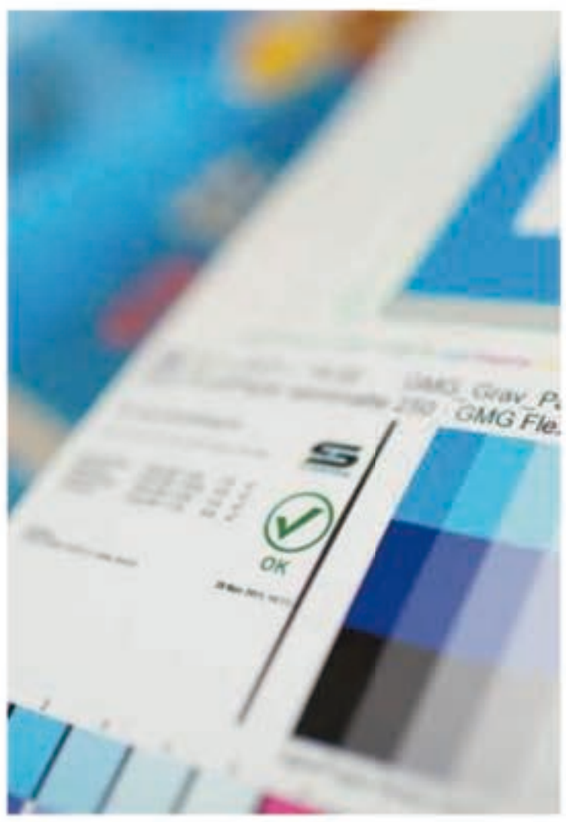
- 由標準和規格定義
- 必須定明量度方法
- 有些品牌會指定使用的器材

Production

- May not be practical to measure everything
- Define levels of importance
- Understand color adjustments
- Mentor the operator

生產

- 每樣東西都量度是未必可行
- 定義重要性的級別
- 要明白顏色調整
- 教育操作員

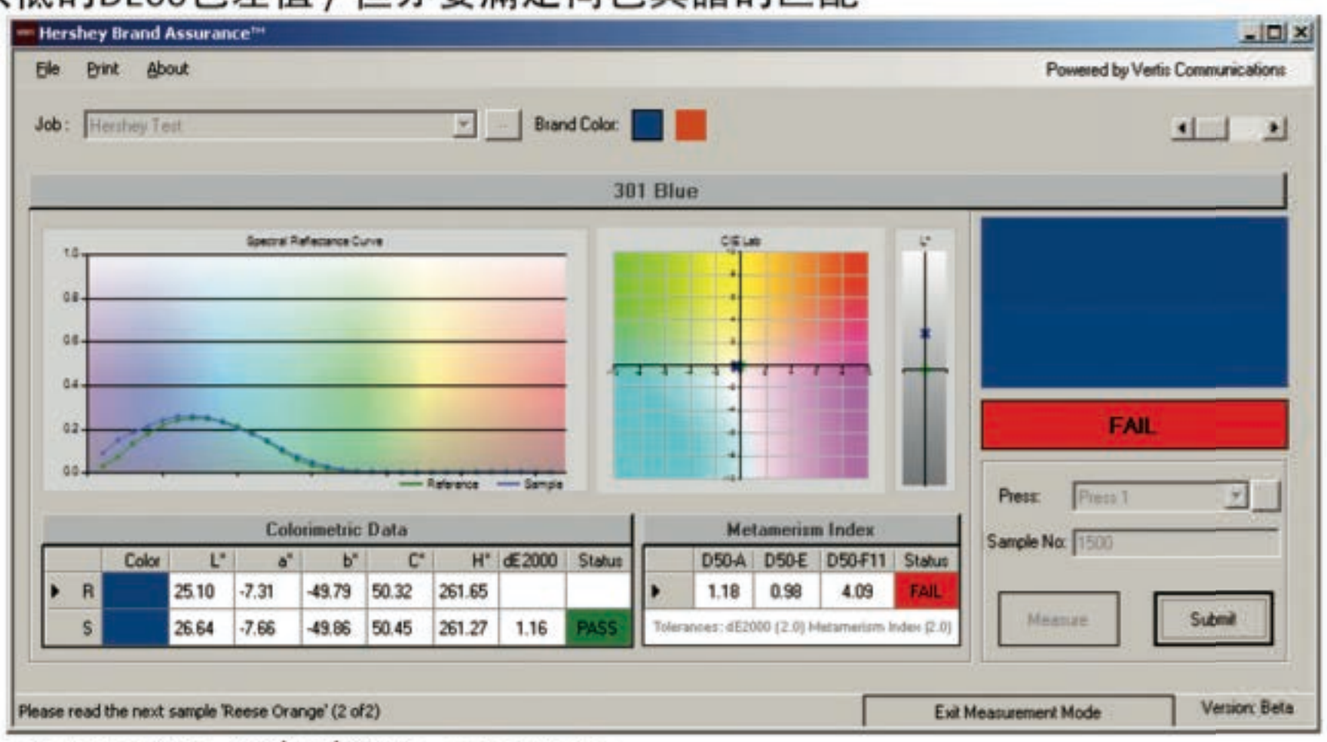


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ISO 17972-4 - CxF X4 Spot Colours Process Control
ISO 17972-4 - CxF X4 專色流程控制

From Design through Print Consistency in ingredients of inks
從設計至印刷的油墨成份的一致性

NOT only low DE00 / but satisfying metameric match also
不只低的DE00色差值 / 但亦要滿足同色異譜的匹配

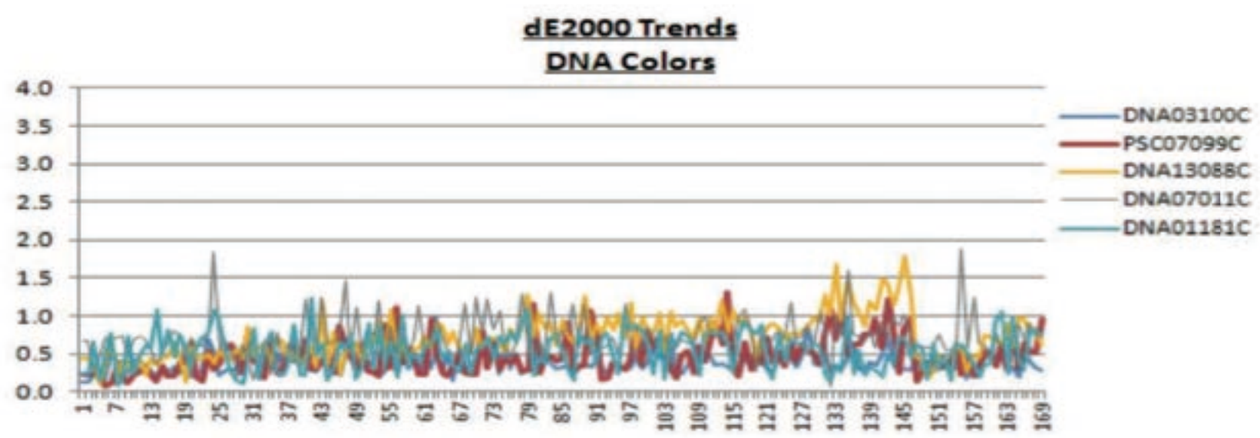


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Cxf X4 Reference for Process Control
給流程控制的 Cxf X4 參考

- CxF X4 as reference for brand colour process control
- Tolerances for both CIEΔ00 <1.5 Brand Colours
- Metameric Match CIEΔ76 < 2 w/ 3 illuminants or spectral tolerancing

- CxF X4 為品牌顏色流程控制的參考
- 品牌顏色的色差寬容度為CIEΔ00 <1.5
- 同色異譜的匹配之CIEΔ76 低於 2, 以及光源或光譜寬容度為 3



NEXT - ICC Version 5 Profiles
下一步 – ICC第五版的特性檔

- ICC has been very active in listening to our request and developing tools for packaging
- V5 Profiles using spectral blending
- Adaptive lighting
- Use of Spectral Color Definitions
- Ability to define surface treatments
- 3-D rendering

- ICC很主動去聆聽我們的要求以及為包裝印刷而開發工具
- V5特性檔使用光譜混色
- 適合的光源
- 使用光譜顏色的定義
- 定義表面處理的能力
- 以3-D演譯

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Thanks for you attention and
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- International Colour Consortium
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- Kevin Chop - Diageo
- Brenda Pang
- Joe Fazzi IDEAlliance
- Alwan
- CGS / ORIS

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SmileyColor is a Brand Management company, focusing across supply chains to improve communication through Standards and Process Control. Providing Brand Standards development, CxFX4 digital data and solution for implementation across brand workflow Design through Press. Providing consulting, press support and training and solutions to improve your Brand management definitions, recognition and consistency with Global Supply Chain Partners.
Representing you in ICC,ISO, FTA, NPES, CGATS, GWG, IDEAlliance Print Properties

攝影流程的色彩管理應用
Color management for photographic workflows



Mr. Thomas Lianza
ICC聯席主席/ X-Rite公司研發總監
Co-Chair, ICC/ Director of R&D, X-Rite

Tom在X-Rite公司擔任圖像軟件的研發總監，同時也是ICC的聯席主席。Tom在羅徹斯特理工學院（RIT）獲得攝影科學與儀器碩士學位。他創辦了三間公司，其中之一由他現任僱主X-Rite所收購了。他目前在X-Rite的工作圍繞顏色測量標準化和顏色誤差分析。Tom在固態掃描、測色發光顯示器、以及系統校準等領域擁有超過11項專利。他在業餘喜歡攝影、木材加工和電子設計。Tom在攝影行業已有超過40年實踐經驗並將色彩管理運用在他的攝影中。

Tom is employed by X-rite Inc. as a Director of R&D in the area of imaging software. He is also Co-Chair of the ICC. Tom has a Master Degree of Photographic Science and Instrumentation from Rochester Institute of Technology. He has been a founder in three startup companies, one of which was purchased by his current employer. His current work at X-rite revolves around color measurement standardization and analysis of color errors. Tom holds over 11 patents in areas such as solid state scanning, color measurement of emissive displays, and system calibration. Tom enjoys photography, wood-working and electronic design in his spare time. Tom has practiced photography for over 40 years and use color management in all of his photography.

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ICC Color Symposium

13/11/2013 · Hong Kong



Color Management for Photography
攝影流程的色彩管理應用

Thomas Lianza
Director of R&D Imaging, X-Rite

Organizer: The Hong Kong Printers Association 香港印刷業商會

Implementing Agent: APTEC 印刷科技研究中心有限公司 Advanced Printing Technology Centre Ltd. (A Subsidiary of The Hong Kong Printers Association)

Co-organizers: ICC; Hong Kong Design Institute 香港知專設計學院

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The nature of the work dictates the workflow
攝影種類決定了工作流程

- Sports/Event Photography
- Landscape Photography
- Portrait Photography
- Forensic/Heritage Photography
- Fine Art Photography

- 運動／活動攝影
- 風景攝影
- 人像攝影
- 法證／遺產攝影
- 藝術攝影

Sports, Wedding and Event Photography
運動、結婚及活動攝影

Image Courtesy: Tom Lianza



- Uncontrolled lighting (stadiums, mixed lighting indoors)
- Short Schedules
- Color accuracy is not necessarily the prime goal
- Good reproduction of “memory colors”
- Generally shot using a fixed color space such as sRGB or AdobeRGB
- This is termed OUTPUT REFERRED shooting
  - Color processing occurs in camera

- 難以控制的燈光(舞台、混合的室內燈光)
- 短時間
- 色準並不一定是最終目的
- 還原理想的「記憶的顏色」
- 通常使用固定的色彩空間攝影，例如sRGB或AdobeRGB
- 這稱為輸出相關性(OUTPUT REFERRED)攝影
  - 在相機內的顏色處理

Landscape Photography
風景攝影

Image courtesy: Tom Lianza



- Lighting is uncontrolled, but the time of day that shooting occurs can be determined
- Schedules are not fixed and there is time for post processing
- Color accuracy is not often desired
- Generally shot in “raw mode”.
- This is sometimes called SCENE REFERRED IMAGING.
  - Post processing is always required
  - Camera calibration not a priority

- 不能控制光源，但能自行決定時候拍攝
- 沒有特定的時間及有時間進行後期製作
- 色準通常並不能達到
- 通常拍攝為「原始檔模式」
- 這有時會稱為場境相關性圖像(SCENE REFERRED IMAGING)
  - 後期加工通常是必須的
  - 相機校正並非最重要的

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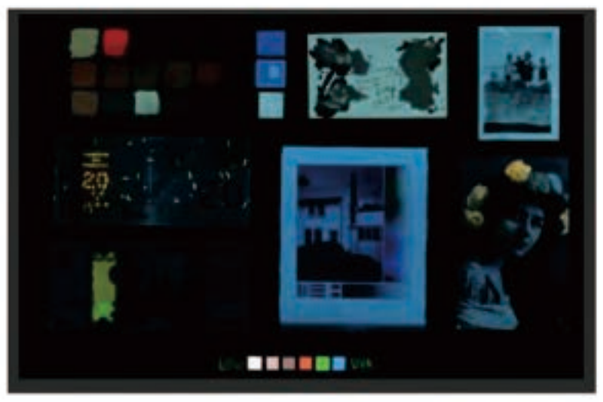
Portrait Photography 人像攝影

- Lighting is carefully controlled
- Schedule is flexible
- Often shot in Raw mode or fixed color space
- Raw is often preferred because there are needs for selective color editing such as flesh tone adjustment.
- SCENE REFERRED – color calibration is stable
- ICC calibration often recommended

- 小心控制燈光
- 時間可以靈活安排
- 通常以原始檔模式(Raw mode)或固定色彩空間進行拍攝
- 建議使用原始檔模式因為有需要進行選擇性顏色(selective color)修正，例如膚色修正(flesh tone adjustment)。
- SCENE REFERRED – 顏色校正是穩定的
- 通常建議需要ICC校正

Forensic/Heritage Photography 法證／遺產攝影

Image Cutesy of UVinnovations





- Lighting can be unpredictable
  - Outdoors, often in physically isolated environments.
  - May require special UV lighting for detection of counterfeit currency/postage stamps.
- Schedule is unpredictable
  - Law enforcement needs quick turnaround
  - Historical work can be post processed.
- Some Law enforcement activities forbid editing of image data.
  - Always OUTPUT REFERRED, in camera processing
- Heritage Photography may require very accurate color rendering
  - Normally shot with a raw workflow
  - Care should be taken with UV content

- 不能預測光源
  - 戶外，通常是被隔離的環境
  - 可能需要特別UV燈以偵測仿造的貨幣／郵票
- 不能預測時間
  - 法證需要很短周轉時間
  - 歷史性的工作需要後期加工
- 有些法例更禁止修改圖像
  - 通常是在相機內處理的 OUTPUT REFERRED
- 遺產攝影可能需要非常準確的顏色轉換
  - 通常使用原始檔的流程拍攝
  - 要小心處理需要使用UV的物件

Fine Art Reproduction
藝術品複製



- Lighting extremely well controlled
  - Ultra violet output is carefully removed
  - Heat from lamps must be carefully monitored
  - Multiple exposures are common for specific color rendering requirements.
- Color reproduction goals must be carefully considered: How is the final image presented?
  - Viewed as hanging in the museum?
  - Viewed as by the artist?
  - Viewed as an "improved" or repaired image.
- Almost always shot using a RAW workflow.
- Sometimes multispectral capture is used.

- 必須要非常好地控制燈光
  - 小心消除額外的紫外光
  - 燈泡的熱要非常小心監察
  - 為特別的顏色轉換要求，多重曝光是很普遍
- 顏色複製的最終目的一定要小心考慮：最終的圖像是如何演繹
  - 掛在博物館內?
  - 由藝術家欣賞?
  - 當作為改善了或修正了的圖像去欣賞
- 差不多所有均是使用原始檔流程拍攝
- 有時候會使用多光譜拍攝

Scene Referred vs. Output referred.

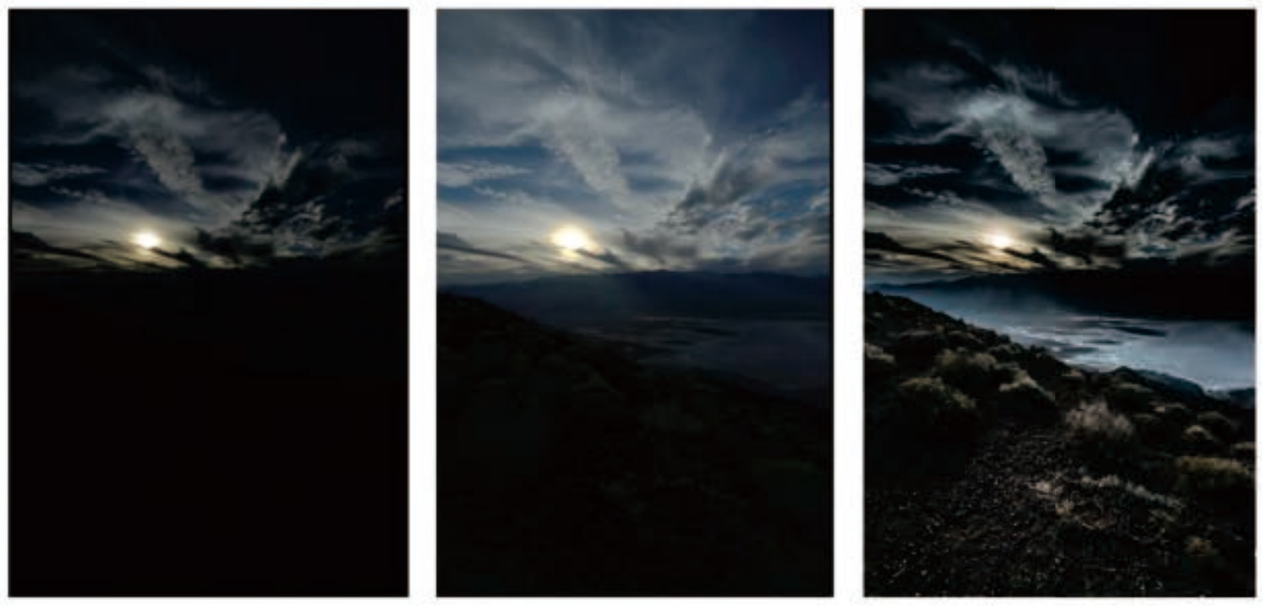
Raw Processing has advantages
使用原始檔處理具有優點

Image 1: sRGB

Image 2 sRGB processed: manipulating curves and exposure.
圖像2：sRGB處理：使用曲線和曝光控制

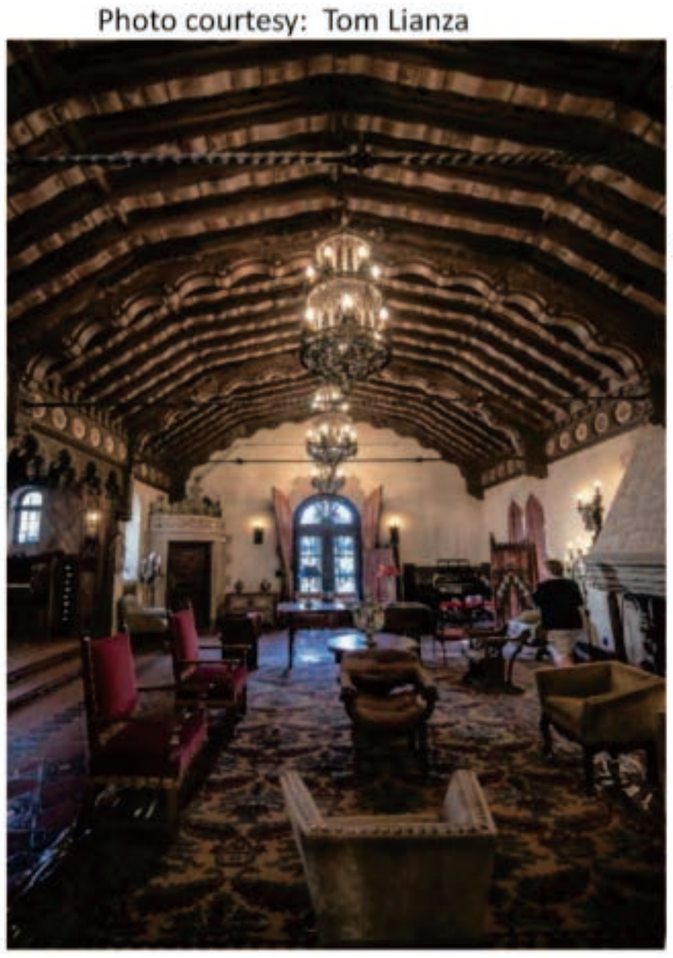
Image 3: raw Processed with multiple effects.
圖像3：原始檔
使用多重效果處理

Major point: no HDR processing, single exposure
重點：沒有高動態範圍處理，使用單一曝光



High Dynamic Range Imaging 高動態範圍圖像

Photo courtesy: Tom Lianza



- Modern camera recording minimizes the need for HDR in many situations
- HDR images need special attention to post processing.
- Photographers must work very hard to with a calibrated display and ICC workflow to simulate appearance in low Dynamic Range printing situation

- 很多情況，現今的相機記錄減低了對高動態範圍的需要
- 高動態範圍影像需要特別注意後期加工
- 攝影師須很努力配合使用一部已校正的螢光幕和ICC色彩流程以模擬在低動態範圍的印刷情況

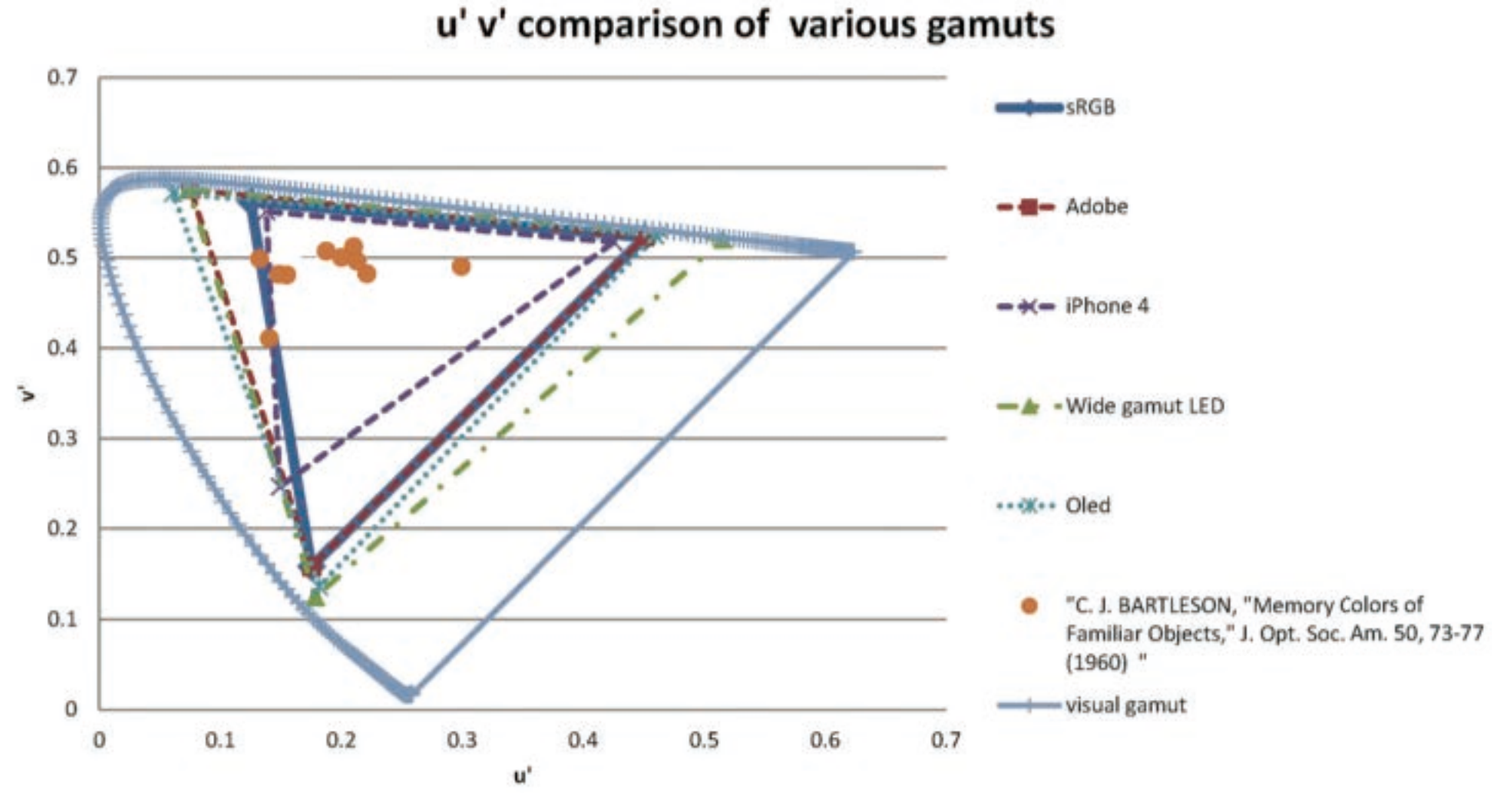
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Key Points 重點

- The requirements of the workflow often dictate limits of color management:
  - "We shoot with the light we have, not the light we wish we had"
- Precise color reproduction may not be desirable in all instances.
  - "Correct" color balance at Sunset and Sunrise often is worse than "calibrated" color
- Capture of the digital image is important, but a digital image can be viewed under many different environments.
- Color management may not be important upon capture of the image, but it is always important when the image is output for viewing.

- 工作流程的要求通常決定了色彩管理的限制：
  - 「我們拍已有的光線，並非想有的光線」
- 精確的顏色複製未必在所有情況下是理想的
  - 「正確」的日落及日出的色彩平衡通常是比已「校正」的顏色為差
- 捕捉數碼影像是最為重要的，但一個數碼影像能夠在不同的環境下觀看
- 當捕捉影像時，色彩管理可能不重要;但當影像要輸出觀看時，色彩管理則通常很重要

Display Gamut and Memory Colors
螢光幕色域及記憶的顏色



Understanding the sRGB color space
明白sRGB色彩空間

- Electronic Display referred
  - Colorimetry is based upon HDTV Rec.709
  - Tone reproduction characteristics similar to HDTV.
  - Some colors do not transfer well to print
- sRGB handles “memory colors” well.
- Images are assumed to be viewed in dim lighting conditions.
- Image contrast is often boosted in sRGB processors to “enhance” the image.
- An sRGB image may often appear too dark when printed without post processing.

- 電子螢光幕是指:
  - 比色法是基於HDTV Rec. 709
  - 階調複製特色與HDTV相似
  - 有些顏色不能理想轉換至印刷
- sRGB 處理「記憶的顏色」處理得很好
- 圖像假設在暗環境下觀看
- 圖像反差通常可以在sRGB處理器內得以提升，從而加強圖像
- 一個sRGB圖像在印的時候，可能通常出現太暗而沒有後期加工

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Understanding the sRGB color space
明白sRGB色彩空間

- Wide gamut capture and output
  - The primaries were selected to encompass the CMYK gamut of many printers
- The dynamic range is specified to be approximately 288:1
  - This dynamic range exceeds most print applications and is less than most modern displays
- Adobe RGB normally requires active color management for reproduction on most media.

- 闊色域攝取及輸出
  - 四色是被選擇以包含很多打印機的CMYK色域
- 動態範圍是指定大約288:1
  - 這個動態範圍超越大部份的印刷系統但比現今螢光幕為少
- Adobe RGB通常需要色彩管理以用作大部份媒體的複製

"Profiling" a camera
將相機特性化





- A number of applications are available for profiling a camera
  - A well behaved camera is a major requirement
  - Well controlled lighting is a requirement
- Various targets are available for profiling
  - Colorchecker Passport is useful for DNG profiling
  - ColorChecker SG is often used for profiling

- 有多個應用可製作相機特性檔
  - 一個表現良好的相機是主要的要求
  - 良好控制燈光
- 多個測試圖可用作特性檔製作
  - Colorchecker Passport 有用於DNG 特性檔
  - ColorChecker SG 通常用作特性檔製作

Understanding the difference between an ICC profile and an Adobe DNG profile
明白ICC特性檔與Adobe DNG特性檔之分別

- ICC profile is based upon a fixed lighting assumption
  - Generally considered more accurate in fixed lighting situations
- Adobe DNG profile contains transformations for interpretation of the color temperature of the source.
  - Easier to generate
  - X-rite ColorChecker Passport

- ICC特性檔是建基於一個固定的光源的假設
  - 通常在一個固定的光源情況下會更準確
- Adobe DNG 特性檔包含轉換以描述來源的色溫
  - 更容易去產生
  - X-rite ColorChecker Passport

Bringing a digital photo to print
印刷數碼相片

- ICC techniques may not be needed for image capture, but they are absolutely required for graphic arts printing.
- Different workflows require different methods to manage color.
- Two Basic Considerations:
  - Early Binding
  - Late Binding

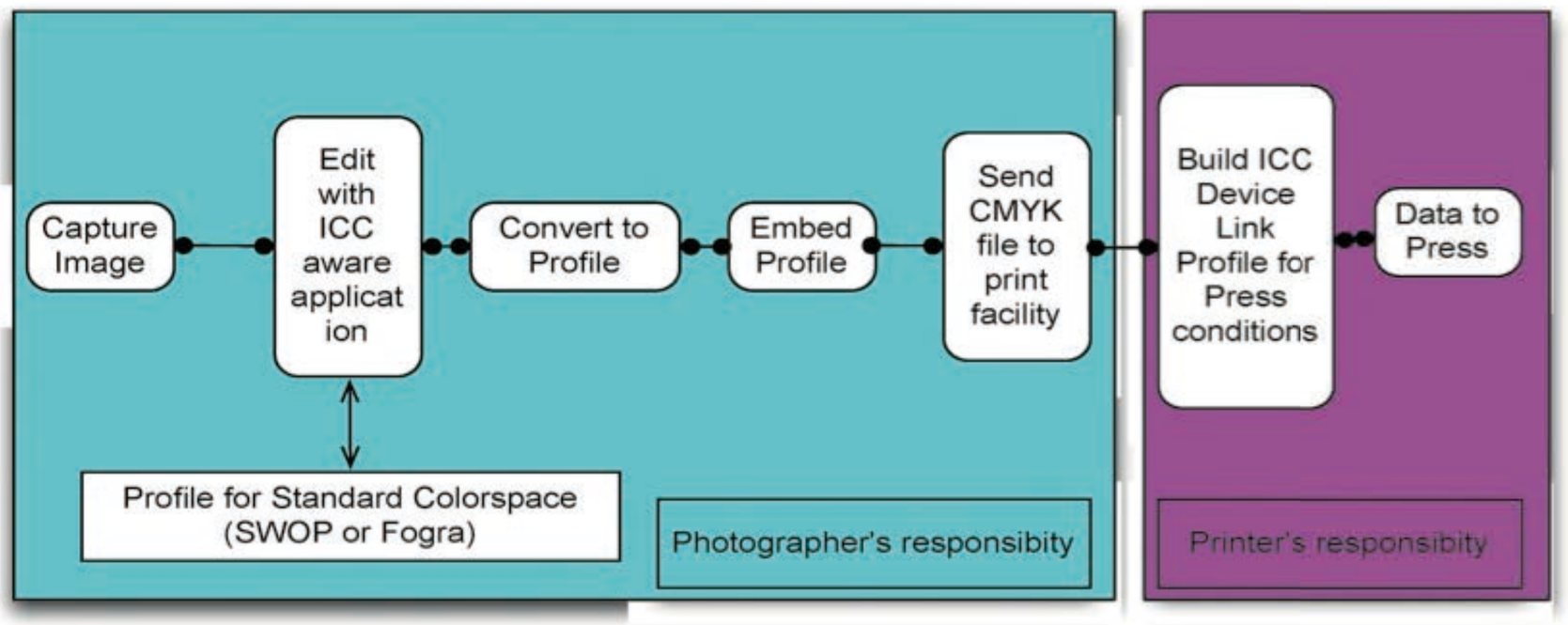
- ICC技巧可能在圖像攝取未必需要，但在印刷上絕對是有需要
- 不同的工作流程需要不同的方法處理顏色
- 兩個基本考慮因素：
  - 前期轉換
  - 後期轉換

What does Binding mean?
什麼是轉換?

- A job is “bound” when the color management has been applied.
- Early Binding:
  - RGB->CMYK occurs before delivery to the printer
- Late Binding:
  - RGB image is delivered with an appropriate profile for conversion by the printer.
- Most Printers want Early Binding.
  - The Photographer is responsible for the color transformation.
- Late Binding is preferred when the image is used in multiple media.

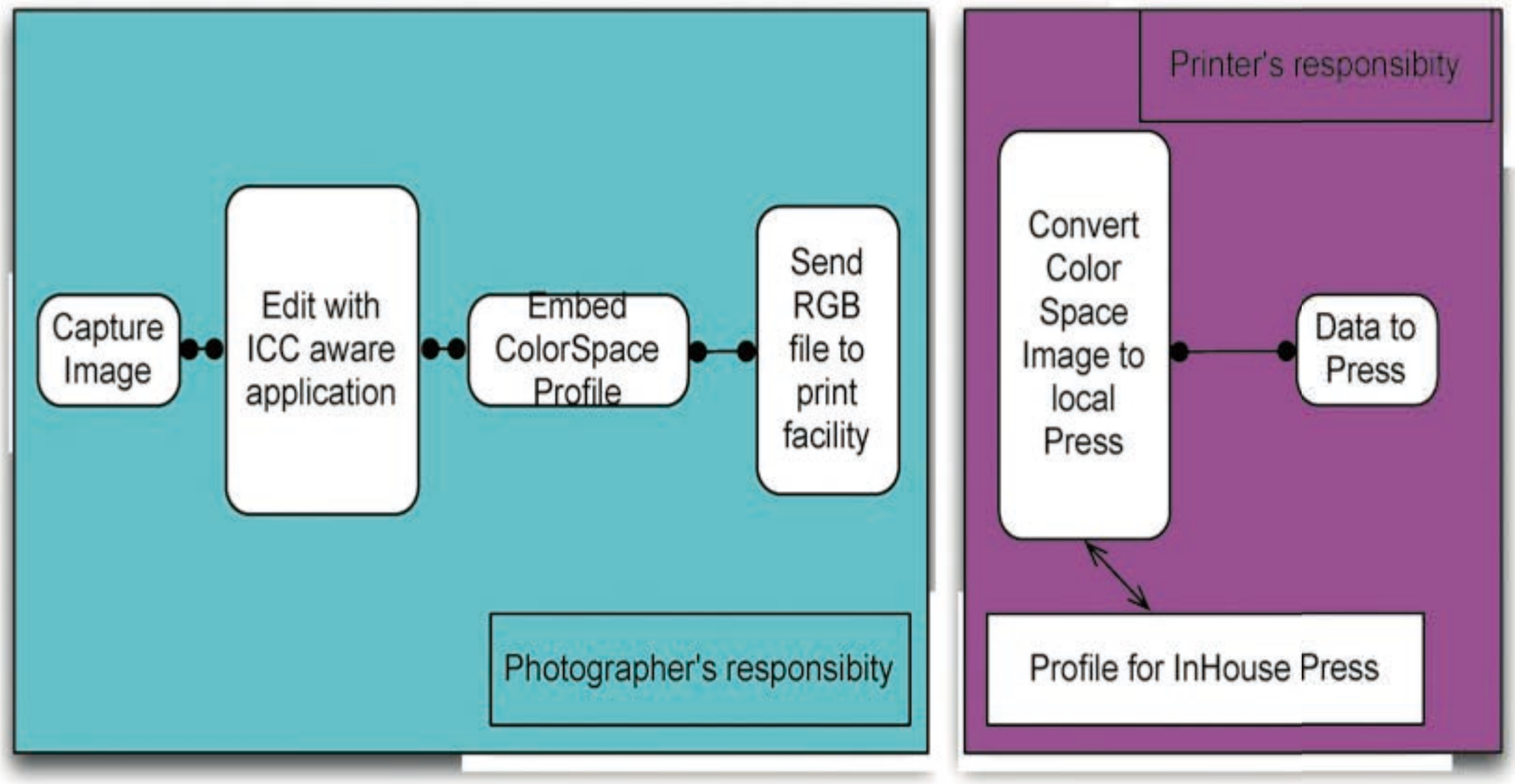
- 如果圖像已使用了色彩管理，這稱為 “已轉換”。
- 前期轉換：
  - 當送往印刷商前，RGB已轉成CMYK
- 後期轉換：
  - 當RGB圖像送往印刷商，印刷商會將RGB圖轉換成適當的特性檔
- 大部份印刷商均希望使用前期轉換
  - 攝影師負責顏色轉換
- 當圖像是在不同媒體使用時，建議使用後期轉換

Early Binding Workflow
前期轉換工作流程



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Late Binding Workflow
後期轉換的工作流程



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Late Binding requires more work for printers.
後期轉換需要印刷商進行更多工作

- All color decisions must be made at the local facility.
- Very difficult to control color between facilities
- Requires Artistic evaluation at print facility.
- Difficult to proof reliably.

- 所有顏色決定一定是在印刷廠內製作
- 在印刷廠之間，控制顏色是非常困難的
- 在印刷廠需要從美術角度去評估
- 很難做到可靠的打稿

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Early binding forces the photographer to make color corrections
早期轉換迫使攝影師去進行顏色修正

- Corrections occur prior to CMYK conversion and there is less chance that the photographer will object to the CMYK outcome.
- Photoshop does a good job of on screen proofing if the display is properly calibrated and profiled.

- 在CMYK轉換前進行修正，攝影師會很少不滿CMYK所輸出的效果
- 若螢光幕已被正確校正和特性化，Photoshop 是一個很好的工具去製作軟打稿

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Screen Calibration is Essential
螢光幕校正是必需的

- Display calibration is the least expensive, most widely available calibration technology.
  螢光幕校正是最便宜的，是最普遍的現有校正技術
- Key vendors are X-rite and Data Color
  主要供應商是X-rite及Data Color





Some Conclusions 結論

- Color Management in Digital Photography can be applied in different ways.
- Color Management requires good communication between the Photographer and the Printer
- Display Calibration is an essential part of all photo activities.
- Light Binding workflows and poor communication = unpredictable results.

- 數碼攝影的色彩管理可以以不同的方法應用
- 色彩管理需要攝影師和印刷商有良好溝通
- 螢光幕校正是所有攝影活動的必須部份
- 初期轉換的工作流程及溝通不足＝未能預測的結果

跨媒體的檔案處理及色彩管理
Cross media process and color management

跨媒體的檔案處理及色彩管理



Mr. Kin Wah Lam
出版技術顧問
Publishing Technology Consultant

Kin Wah Lam曾在時代集團任職27年並擔任重要角色。在過去的10年，他作為數碼化發展部的總監，負責監督多個策略項目，將時代集團在美國境內和跨國際地區生產和出版精簡及整合為一。Kin所創造傑出和顯著的里程碑包括：為編輯和廣告製作實施PDFx1a檔案格式、將SWOP ICC特性檔應用於虛擬打樣、改寫廣告網上平台、將以雲端為基礎的生產技術與元數據融合，達至流程自動化和智能檔案傳送、建立中央轉換工作流程，以製作平板的高品質廣告檔，以及研究和實施油墨優化技術，提高印刷品質，並同時節省油墨用量。

Kin亦主持許多IDEAlliance的工作小組，並是一個行業標準和規範的倡導者。

Kin held many critical roles in the 27 years that he was with Time Inc. In the past 10 years and as the Director of Digital Development, Kin was responsible for the oversight of many strategic initiatives that streamlined Time Inc Production and the publishing industry as a whole within the United States and across the international regions. A few of the distinguished and significant milestones accomplished by Kin include the implementation of PDFx1a file format for Editorial and Ad Production, the deployment of Virtual Proofing using SWOP ICC Profiles, the adaptation of the Ad Portal, the leveraging of Cloud-based production technologies incorporating metadata for process automation and intelligent file delivery, the creation of centralized rendering workflow to create high quality ad files for tablet production, and last but not least, the exploration and the implementation of the Ink Optimizing Technology to enhance print quality while minimizing ink utilization.

Kin also has co-chaired many IDEAlliance Working Groups and is a strong advocate in embracing industry standards and specifications.

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跨媒體的檔案處理及色彩管理

Cross Media From Print to Tablets

Kin Wah Lam
klam.connect@gmail.com
Formerly with Time Inc, Director of Digital Development

Organizer: The Hong Kong Printers Association 香港印刷業商會

Implementing Agent: APTEC 印刷科技研究中心有限公司 Advanced Printing Technology Centre Ltd.

Co-organizers: ICC; Hong Kong Design Institute 香港知專設計學院

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Agenda 議程

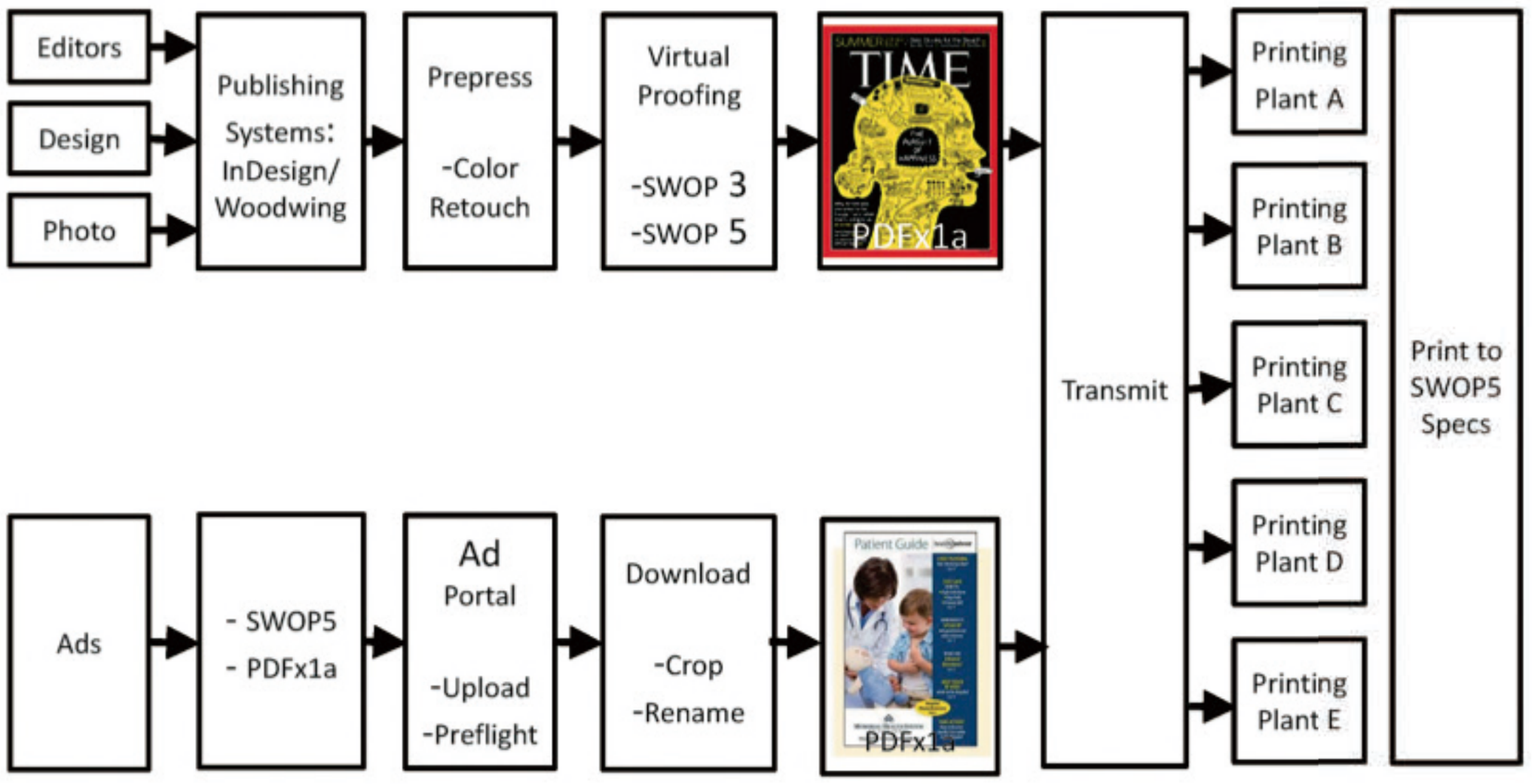
A Look at Time Inc Workflow and Guidelines for effective cross media from print production to tablet production.

探討時代雜誌有關跨媒體的流程以及指引，如何達到從印刷至平板電腦有效的製作

- Quality 品質
- Rendering to Specifications 檔案製作及轉換
- Applying Automated Workflow 自動化流程
- Color Management for Tablets 平板電腦的色彩管理

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Print First: A Typical Print Workflow
先是印刷：典型的印刷工作流程



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Then came the iPad on April 2010
至2010年四月，開始發展 iPad版



- TIME Magazine App was launched on the same day with the Apple iPad 1
  時代雜誌App是與Apple iPad 1同日發佈
- This first Digital Edition of TIME was sponsored by a single advertiser
  這是第一個時代雜誌電子版由一個廣告商贊助



All 21 Time Inc titles are available as Digital Editions
所有21個時代雜誌書目有電子版

- 100% of all edit pages are redesigned for tablets
- 75% of ads are Straight From Print (SFP)
- 25% of ads are Designed For Tablets (DFT)
- >1% of ads are Enhanced For Tablets (EFT)
- Majority of digital editions are downloaded on iPad devices

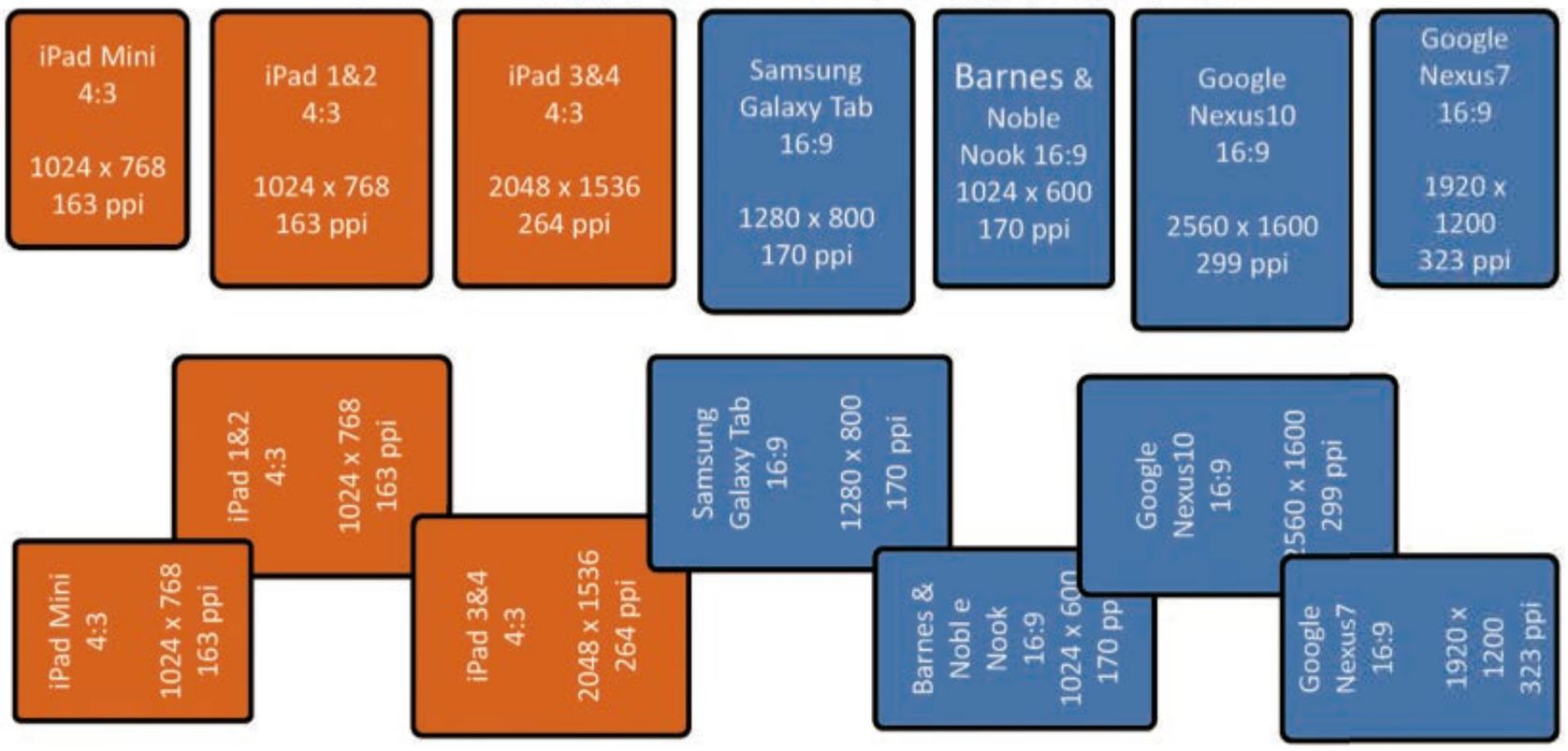
- 100% 的所有文稿是為平板電腦重新設計
- 75% 的廣告是由印刷直接轉換
- 25% 的廣告是為平板電腦而設計
- >1% 的廣告是為平板電腦而改進
- 大部份的電子版是下載在 iPad上

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Production and Workflow
製作及工作流程

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Many Tablets 平板電腦種類凡多:
Sizes, Resolutions, PPI and Headaches
大小、解像度、PPI及頭痛的問題



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21 Titles: 3 Types of Digital Editions
21個書目：3 種電子版本

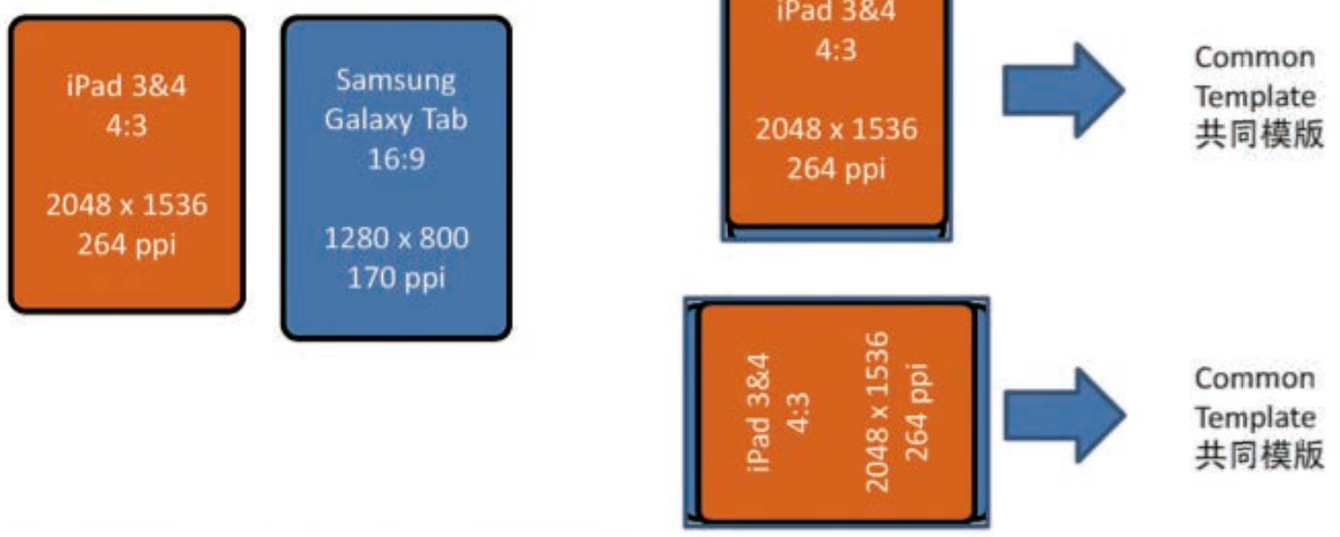
Portrait & Landscape 直度及橫度	Portrait 直度	Portrait PDF Only 只有直度PDF
8 Titles 8 個書目	9 Titles 9 個書目	4 Titles 4 個書目
Edit Pages are redesigned in both Portrait and Landscape Modes 內容重新設計至直度及橫度	Edit Pages are redesigned for Portrait Mode only 內容重新設計至直度	Edit Pages are basically same as Print 內容跟印刷版相同
Tap & Zoom disabled 不能點按及放大	Tap & Zoom enabled 能夠點按及放大	Tap & Zoom enabled 能夠點按及放大

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Common Templates for Any Tablets
供任何一個平板電腦的共同模版

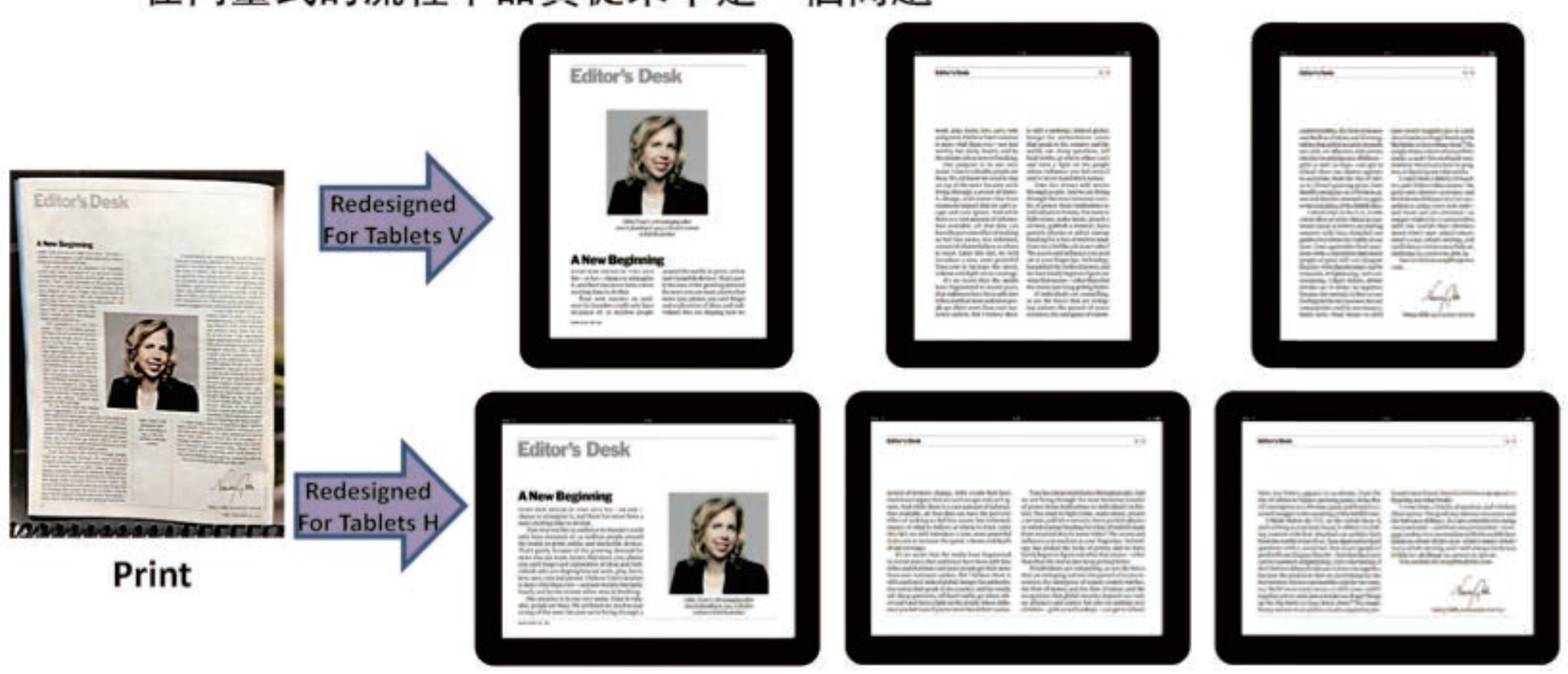
- Common Templates (one size fits all) in Portrait and Vertical
  直度及橫度的共同模版 (一個大小適合所有)
- Eliminated the need to redesign for 4:3 and 16:9 devices
  去除為4:3及16:9重新設計的需要



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Editorial Pages 文稿

- Editorial pages must be redesigned from within InDesign
  文稿一定需要在InDesign內重新設計
- Quality concern is never an issue based on true vector process
  在向量式的流程中品質從來不是一個問題



Advertising Pages 廣告

- 3 types of ad pages and specifications
  三種廣告及規格
  - 75% Straight From Print (SFP), these are PDFx1a print files
    75% 的廣告是由印刷直接轉換，是PDFx1a印刷檔
  - 25% Designed For Tablets (DFT)
    25% 的廣告是為平板電腦而設計
  - >1% Enhanced For Tablets (EFT)
    >1% 的廣告是為平板電腦而改進

- Tablet Ad Specifications: www.direct2time.com
  平板電腦格式的廣告規格：www.direct2time.com

Lessons after a year of tablet production:
平板電腦製作後的一年：

Placing SFP (PDFx1a) ads directly into InDesign templates produced poor quality! This is due to limitations of InDesign Export Rendering Engine as it produces poor down-sampling and lacks smoothing functions.

直接將SFP (PDFx1a) 之廣告置入InDesign模版產生差的品質！這是由於InDesign輸出轉換器之限制，因這會產生影像取樣減少以及缺乏平滑性的功能。

The results were:

- Text were not smooth, full of JAGGY Edges
- Visible White Lines or Tiling Edges
- Missing spot colors
- Improper transparent rendering
- Some advertisers complained

結果是：

- 文字不平滑，充滿踞齒
- 明顯出現白線及格線
- 專色消失
- 不正確的透明效果
- 有廣告商投訴

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Addressing the Rendering Quality
針對轉換的品質

- Each PDFx1a ad file needs to be **rastered** before placing into the InDesign Tablet Templates

  在置入InDesign平板電腦模版前，每一個PDFx1a廣告檔需要進行格式化

  - iPad 1&2: 132ppi
  - iPad 3&4: 264ppi
  - Android: 170ppi
  - RGB
  - Save as .png format to avoid image compression

    儲存為 .png格式以防止圖像壓縮

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Quality Problem Solved!
品質問題已解決!



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Automating the Ad Workflow for Tablets
平板電腦廣告流程自動化



Ads: PDFx1a

- Rasterize 格式化
- Down-Sample to multiple Device PPI 圖像取樣縮減至不同設備的PPI要求
- Convert to RGB 轉換至RGB
- Save as .PNG 儲存至 .PNG
- Organize 組織
- Rename Files 檔案重新改名



iPad3&4: 264 ppi iPad1&2: 132 ppi Android: 170 ppi

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Color Management in the Tablet World
平板電腦世界的色彩管理

Tablet Color Management Key Points
平板電腦色彩管理的重點

- iOS & Android OS (include Kindle & Nooks) don't support ICC profiles
- Default White Color Temperature are all different
  - iPad devices range from D70 to D72
  - Android devices range from D72 to D81
- Gamma varies hugely from different manufacturers (1.70 to 2.15)
- Brightness and Contrast ranges from 350 cd/m2 to 430 cd/m2

- iOS 及Android OS (包括Kindle 及 Nooks) 不支援ICC特性檔
- 所有設備所預定的白色溫是不同
  - iPad 的範圍由D70至D72
  - Android的範圍由D72 至 D81
- 不同的製造商所定的伽瑪值分別很大(1.70 to 2.15)
- 光度及反差度範圍由350 cd/m2 至 430 cd/m2

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How Well Do SWOP Profiles Fit Into Tablet Colorspace?
SWOP特性檔如何適合於平板電腦之色域空間

- It works well
  - Convert SWOP color space to RGB
    - ICC profile not needed, it doesn't matter
    - 1 Less channel
    - Smaller file size
- Images appear higher contrast, attributed to:
  - Glossy Displays
  - Higher PPI
  - Cooler White Point

- 這運作得很好
  - 將SWOP色域空間轉至RGB
    - ICC特性檔不需要
    - 少一個色版
    - 檔案較細
- 圖像出現高反差，歸因於：
  - 光澤的螢光幕
  - 更高的PPI
  - 較冷的白點

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Color Related Reactions From...
相關顏色的反應來自 ...

- Consumers 顧客
  - None 沒有
- Advertisers 廣告商
  - Almost None 通常沒有

Based on previous responses...
基於之前的反應 …

- Publishers will Not Guarantee color on Tablet Devices
  - Tablets are similar to Personal Computers and Mobile Devices
  - Consumer don't color manage their Personal Computers and Mobile Devices
- There are too many tablets, mobile devices and display technologies
- The payload of color managed files negate any real cost benefits
- Few consumers will notice products with color management

- 出版商是不能保證平板電腦上的顏色
  - 平板電腦與個人電腦和手提電話相似
  - 顧客不理會其個人電腦和手提電話的顏色處理
- 現在有太多平板電腦、流動設備以及螢光幕技術
- 要處理色彩檔案之成本比效益大
- 很少顧客會留意具色彩管理的產品

Resources 資料

Technologies 技術

- Woodwing – Editorial Systems for content creation and management
  - Content Stations – Tablet Creation component of Woodwing
  - www.woodwing.com
- SendMyAd – Ad Portal to allow advertisers upload DFT and/or Print Ads
  - Preflighting of Print Ads
  - Preflighting of DFT Ads
  - Messaging and File Routing
  - www.blanchardsystems.com
- ProImage – A PrePress Production System that serves multiple functions
  - Using XML business rules to intelligently manage file for production
  - Used to render SFP files for Tablet Production
  - www.new-proimage.com

Specifications 規格

- Time Inc Ad Specs
  - www.direct2time.com
- Idealliance
  - Digital Ad Lab
  - www.idealliance.org/specifications/digital-ad-lab

Thank You 謝謝!

Contact: klam.connect@gmail.com
or LinkedIn Kin Wah Lam

ICC最新技術發展 – V.5
New development of ICC – V.5



Mr. Max Derhak
ICC副主席/
Onyx Graphics高級軟件工程師
Vice-Chair, ICC/
Senior Software Engineer, Onyx Graphics

Max Derhak自1990年起已在Onyx Graphics工作，Max持有University of Utah的電腦科學學位、美國羅徹斯特理工學院(RIT)的影像科學碩士、以及現正在RIT修讀色彩科學博士。Max是最先發展開放式來源檔SampleICC及ICCXml項目，現在仍繼續發展。Max現時為ICC的副主席以及ICC結構工作小組的主席，Max活躍於ICCLabs項目及推行RefIccLabs。

Max Derhak has worked for Onyx Graphics Inc. since 1990. Max has a Bachelors in Computer Science from the University of Utah, a Masters in Imaging Science at The Rochester Institute of Technology, and is currently working on a Doctorate in Colour Science at RIT. Max was an initial contributor to the open source SampleICC and ICCXml projects which he continues to maintain. Max serves as the Vice-Chair of the ICC as well as the Chair of the ICC Architecture Working Group and is active in the ICCLabs project and the RefIccLabs implementation.

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New development of ICC – V.5
ICC最新技術發展 – V5

Spectral support in ICCLabs and communicating color in the areas of digital printing and packaging

Max Derhak
Principal Scientist, Onyx Graphics Inc.

Organizer: The Hong Kong Printers Association 香港印刷業商會

Implementing Agent: APTEC 印刷科技研究中心有限公司 Advanced Printing Technology Centre Ltd.

Co-organizers: ICC; Hong Kong Design Institute 香港知專設計學院

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Agenda 議程

- Color Management and some of its Challenges
  - Aspects of Color Science
- Introduction to ICCLabs
  - Touching upon some technical details
- A color managed spectral workflow example
- Conclusion
  - Discussion about benefits and considerations

- 色彩管理以及其挑戰
  - 色彩科學的範疇
- 介紹ICCLabs
  - 會提及一個技術性的內容
- 一個色彩管理的光譜工作流程例子
- 結論
  - 探討其效益和考慮因素

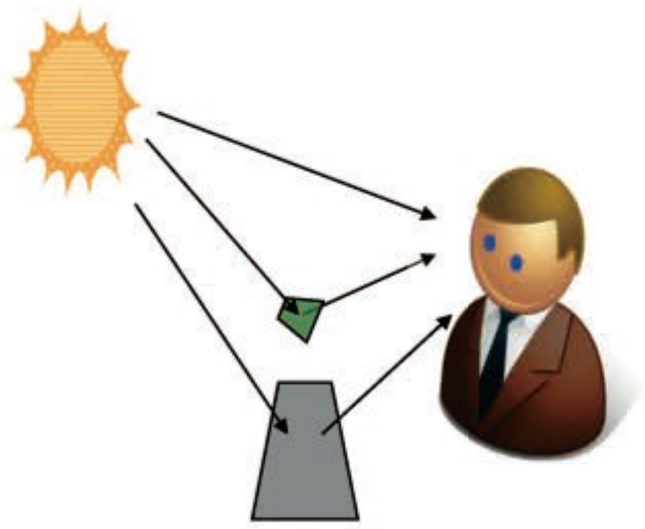
ICC Color Management
ICC 色彩管理

- The purpose of the ICC is to promote the use and adoption of open, vendor-neutral, cross-platform color management systems.
- ICC的目的是為了促進使用和採納開放式、中立以及誇平台的色彩管理系統

- With "Color Management" being defined as the "**communication of** the associated **data** required for unambiguous interpretation of color content data, **and application of** color data **conversions**, as required, **to produce** the **intended reproductions**".
- 「色彩管理」被定義為用作需要明確解釋的彩色內容數據的溝通方法和色彩數據轉換的應用，根據需要產生預期的複製品

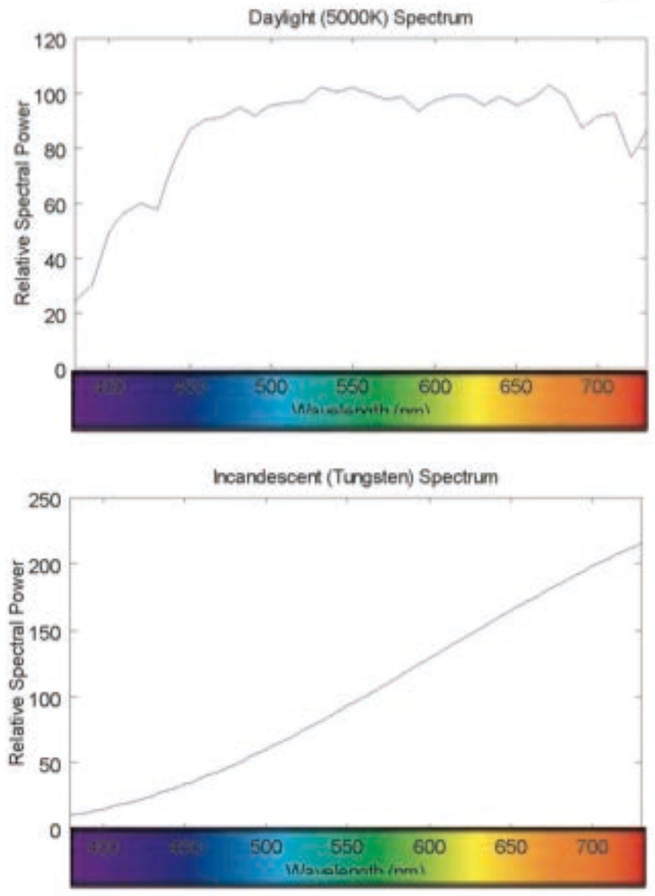
Challenges for Color Management
色彩管理的挑戰

- Different Light Sources
  不同的光源
- Characteristics of Surfaces
  表面的特性
- Variations in Observer
  觀察者的差異
- Modeling Everything
  物件的造型
- Variations in Reproduction Intent
  複製意向的變化



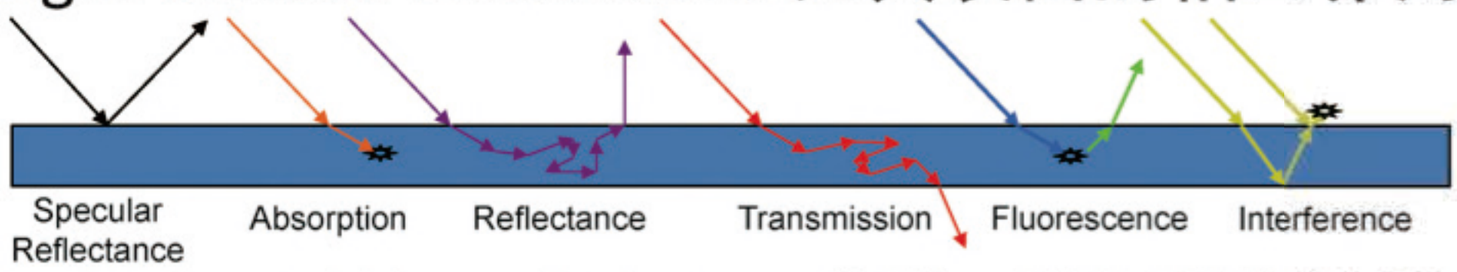
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Differences in Light Sources 不同的光源



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Light-Surface Interactions 光與表面的相互作用



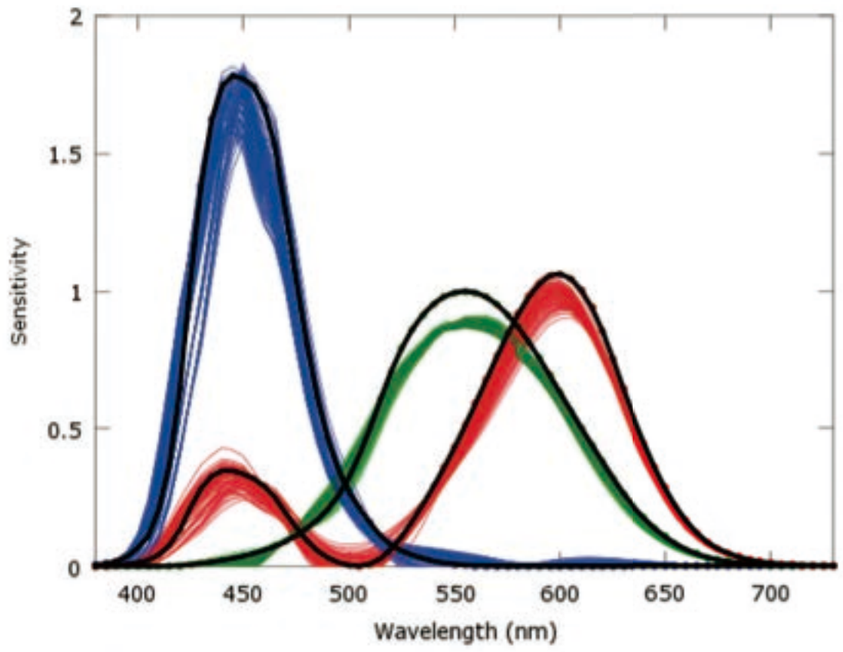
- **Specular Reflectance -** light bounces off surface at the opposite angle unchanged (gloss)
- **Absorption** – light enters surface, bounces around and is absorbed – thus raising the energy level of the surface (e.g. thermal heat)
- **Reflectance/Transmission** – light enters surface, bounces around, and eventually leaves surface unchanged at possibly an arbitrary angle
- **Fluorescence** – light enters surface, bounces around, is absorbed and then re-emitted with a longer wavelength (at a lower energy level), bounces around, and eventually leaves (either) surface.
- **Interference** – light enters surface bounces from opposite surface where it interferes (constructively or destructively) with light just hitting surface (exhibiting angular dependency)

- **鏡反射** – 光線的反射角恰等於其射到表面的角度（光澤）
- **吸收** – 當光觸及表面，不是被反射的即是透射 – 從而提高了表面的能量水平 (如：地熱)
- **折射 / 透射** – 當光進入一表面，行進方向的位移或改變的屈折現象
- **螢光** – 當光進入一表面，被吸收後，再放出較長波長 (處於低能量水平)，最後離開表面
- **干擾** – 光干擾 (建設性或破壞性) 是當光進入表面直從相反的表面反射出時，被另一束射進的光擊中 (展示角度從屬)

- **Note**: *How a photon interacts with a surface is wavelength dependent*

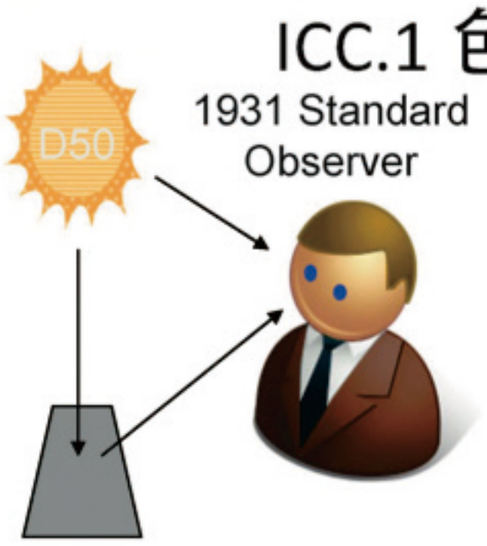
Observer Variability 觀察者的差異

- Differences due to 差異由於
  - –Lens Aging 晶體的老化
  - –Field size (Macula Coverage) 範圍大小 (黃班覆蓋)
  - –Cone Variability 錐體的變異



- CIE 2006 “Normal” Observers vary due to differences in age and field size
- Black curves represent CIE 1931 Standard 2° Observer

ICC.1 Color Management Simplifications
ICC.1 色彩管理的簡化



Note: Other Illuminants can be indirectly represented. However, color data in profile MUST always be converted to these viewing conditions for processing by the CMM.
註：其他光源可間接代表。然而，永遠必須是由色彩管理方法 (CMM) 把特性檔內的顏色數據，轉換至可視條件下進行處理

- ICC.1 color management simplifications:
  - – Based on Colorimetry with Fixed Profile Connection Space (PCS) Viewing Conditions
    - D50 Illuminant
      - – 500 lx
    - Standard 1931 Observer
  - – Simple Reflectance Model
    - Flat surface
    - 0/45 geometry
    - No gloss
    - No Fluorescence
  - – Explicit Transforms…

- ICC.1 色彩管理簡化:
  - 基於基於比色法配合固定特性檔連接空間（PCS）的可視條件
    - D50 光源
      - 500 lx
    - 標準觀察者 1931條件
  - 簡單的反射模式
    - 平面
    - 0/45幾何條件
    - 沒有光澤
    - 沒有螢光
  - 直接轉換…

Going Forward with IccLabs
IccLabs 展望未來

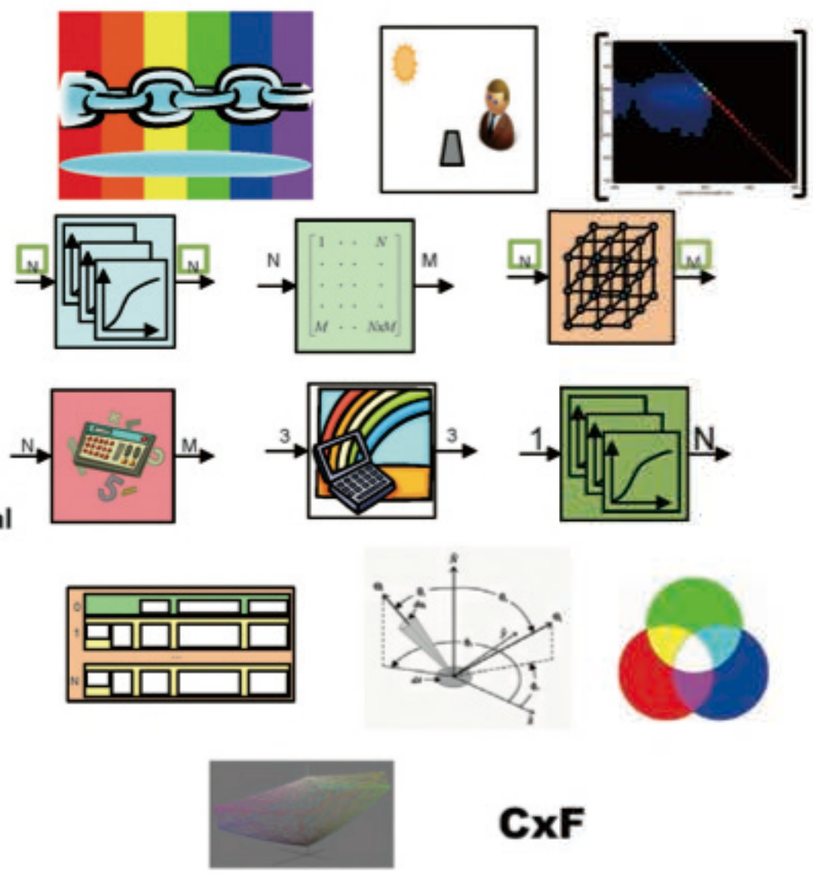


- A main goals of IccLabs address several color management challenges
  - Overcoming limitations of current transforms with D50 colorimetry
  - Adding flexibility and extendibility
- Resulting in a new profile specification and profiles
  - New Color Management Module (CMM) will be backwards compatible with V2 and V4 profiles
  - New profiles (V5) not expected to be compatible with older CMMs
- ICC will provide a reference implementation of an IccLabs based parser and CMM - RefIccLabs

- IccLabs主要目標是指明了幾個色彩管理挑戰:
  - 克服現時轉換時使用 D50 比色法的限制
  - 增加靈活性和可擴張性
- 引致新的特性檔規格和特性檔
  - 新的色彩管理模版 (CMM) 將會兼容V2及V4特性檔
  - 新的特性檔(V5)不會兼容舊版本的色彩管理方法
- ICC 將會提供一個以 IccLabs 為基礎的分析器和色彩管理方法 (CMM) – RefIccLabs 的執行參考

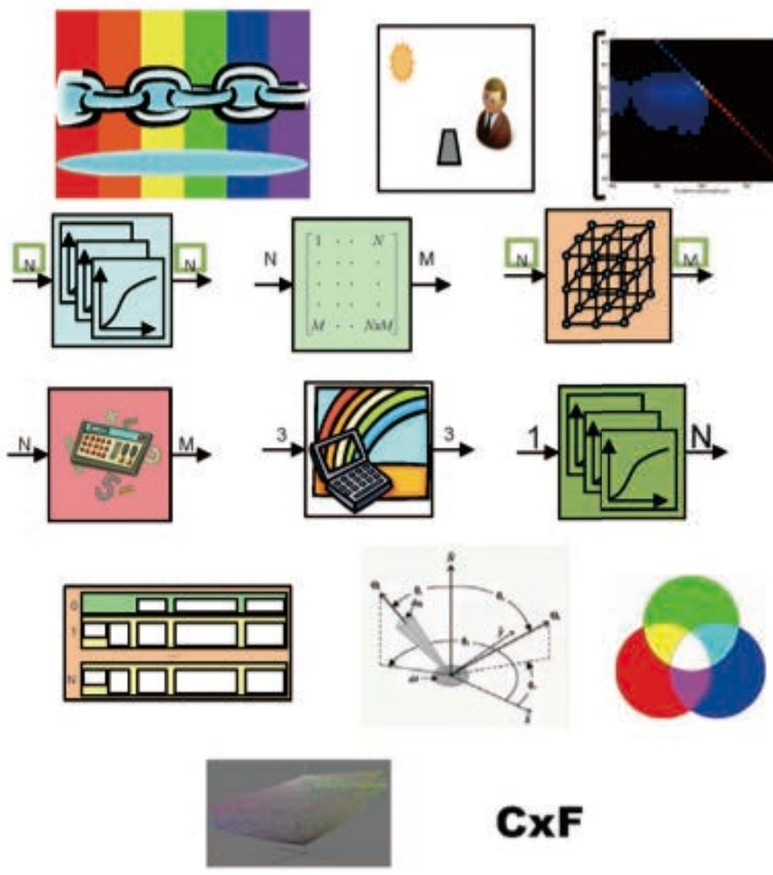
IccLabs – Overview

- Profile Connection Space (PCS) Extensions
  - Spectral profile header extensions
  - Profile Connection Condition (PCC) tags
  - PCS Transforms
  - Sparse matrix encoding
- multiProcessingElements
  - 1-D Look Up Tables (LUTs)
  - Matrices
  - N-dimensional LUTs
  - Calculator element
  - ICC Color Appearance Model element
  - Tint Array element
- Hierarchical tag types
  - Named Color Tag Array
  - Support for angular dependencies via Bidirectional Reflectance Distribution Functions (BRDF)
  - *Profile Sequence Information*
- Other Extensions
  - Color Space Encoding profiles
  - Gamut Boundary Description encoding
  - *Color Measurement (CxF) tag encoding*
  - *UTF8 text & UTF16 encoding*
  - *Additional Numeric Array Types*



IccLabs – 概覽

- 特性檔連接空間 (PCS) 延伸
  - 特性檔標頭延伸
  - 特性檔連接條件標籤
  - PCS 轉換
  - 稀疏矩陣編碼
- multiProcessingElements
  - 一維對照表 (LUTs)
  - 矩陣
  - 多維對照表
  - 計算元素
  - ICC 顏色外觀模型元素
  - 色調陣列元素
- 分層標籤類型
  - 命名顏色標籤陣列
  - 通過雙向反射分佈函數（BRDF）支援角度從屬
  - *特性檔序列信息*
- 其他延伸
  - 色彩空間編碼特性檔
  - 色域邊界描述編碼
  - *顏色測量 (CxF) 標籤編碼*
  - *UTF8 文字與 UTF16 編碼*
  - *附加數值陣列類型*



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Flexible PCS Support
靈活的 PCS 支援



ICC.1 PCS Support	From Lab	From XYZ	From Reflectance	From Transmittance/ Transmissive	From Radiant/ Emission	From Fluorescence
To Lab	Yes	Yes	Using PCC	Using PCC	Using PCC	Using PCC
To XYZ	Yes	Yes	Using PCC	Using PCC	Using PCC	Using PCC
To Reflectance	No	No	Yes	Yes	Extract PCC illuminant	Apply then extract PCC illuminant
To Transmittance/ Transmissive	No	No	Yes	Yes	Use PCC illuminant	Apply then extract PCC illuminant
To Radiant / Emission	No	No	Apply PCC Illuminant	Apply PCC illuminant	Yes	Apply PCC illuminant
To Fluorescence	No	No	No	No	No	Exact match required

ICC Color Symposium · 13/11/2013 · Hong Kong PCC = Profile Connection Conditions 12

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Header changes for PCS extensions
PCS 延伸的標頭轉變

Byte position	Field length (bytes)	Field contents	Encoded as
0 to 3	4	Profile size	UInt32Number
4 to 7	4	Preferred CMM type	See 6.2.3
8 to 11	4	Profile version number	See 6.2.4
12 to 15	4	Profile/Device class	See 6.2.5
16 to 19	4	Colour space of data (possibly a derived space)	See 6.2.6
20 to 23	4	PCS	See 6.2.7
24 to 35	12	Date and time this profile was first created	dateTimeNumber
36 to 39	4	'acsp' (61637370h) profile file signature	See 6.2.9
40 to 43	4	Primary platform signature	See 6.2.10
44 to 47	4	Profile flags to indicate various options for the CMM such as distributed processing and caching options	See 6.2.11
48 to 51	4	Device manufacturer of the device for which this profile is created	See 6.2.12
52 to 55	4	Device model of the device for which this profile is created	See 6.2.13
56 to 63	8	Device attributes unique to the particular device setup such as media type	See 6.2.14
64 to 67	4	Rendering Intent	See 6.2.15
68 to 79	12	The nCIEXYZ values of the illuminant of the PCS	XYZNumber
80 to 83	4	Profile creator signature	See 6.2.17
84 to 99	16	Profile ID	See 6.2.18
[illegible] to 103	4	Spectral colour space signature	See table [illegible]
104 to 109	6	Spectral PCS wavelength range	spectralRange
[illegible] to 115	6	Bi-directional PCS wavelength range	spectralRange
116 to 127	12	Bytes reserved for future expansion and shall be set to zero (00h)	

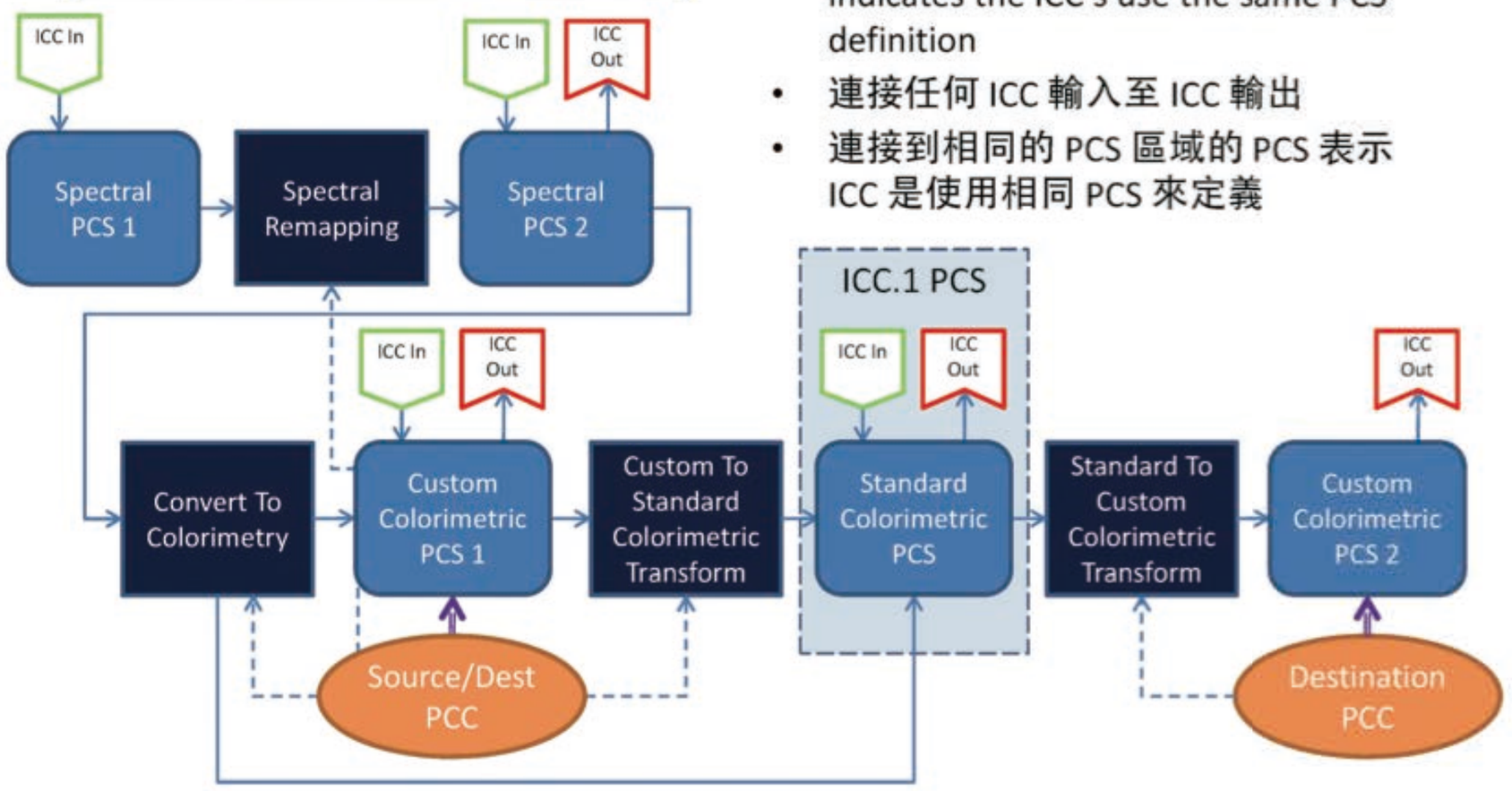
- PCS field defines Profile Connection Space for rendering intent transform A2Bx/B2Ax tags
- Colorimetric PCS can be different than D50 for 1931 standard 2° observer
- Spectral PCS fields defines color space for rendering intent transform D2Bx/B2Dx tags
- Spectral PCS range defines wavelength range
- Bi-spectral PCS range defines excitation range when bi-spectral color space is used

- PCS 區段定義特性檔連接空間用來記錄A2Bx/B2Ax渲染意向變換的標籤
- 比色法 PCS 可以是有別於標準 1931 2° 觀察者條件
- 光譜 PCS 區段定義色彩空間來進行渲染意圖變換 D2Bx/B2Dx標籤
- 光譜 PCS 範圍定義為波長範圍
- 當使用雙光譜色彩空間，雙光譜 PCS 範圍定義為激勵波長範圍

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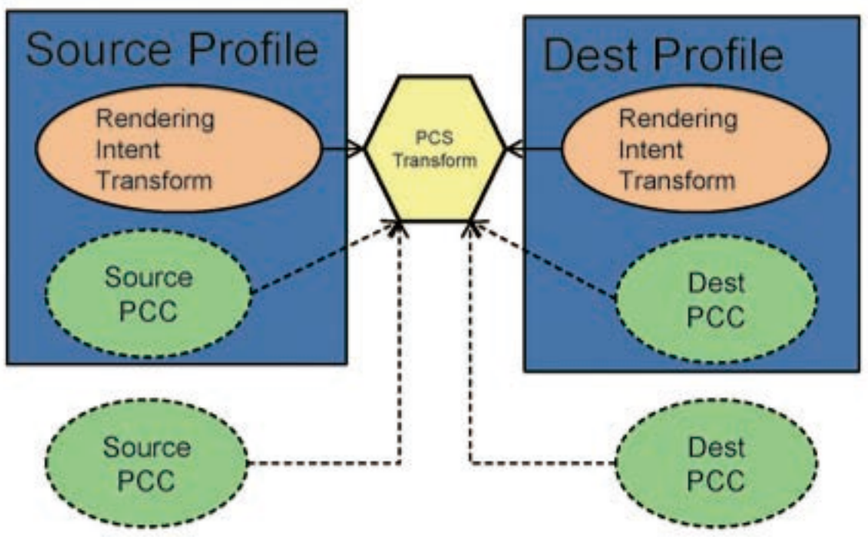
PCS Conversion 轉換

- Connect any ICC In to any ICC Out
- Connection to same PCS block PCS indicates the ICC's use the same PCS definition
- 連接任何 ICC 輸入至 ICC 輸出
- 連接到相同的 PCS 區域的 PCS 表示 ICC 是使用相同 PCS 來定義



Profile Connection Conditions
特性檔連接條件



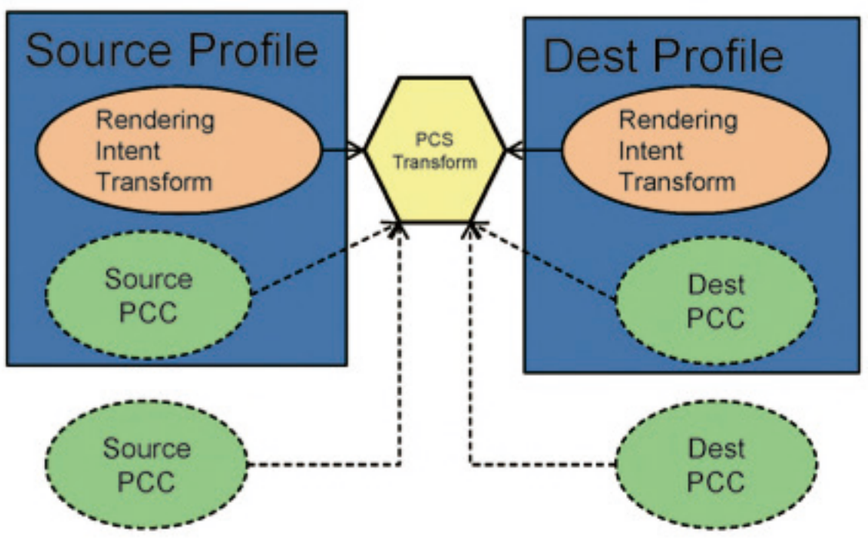


Allows PCS data in profiles to use actual viewing conditions
No need for chromaticAdaptationTag!

- Profile Connection Conditions comprise of:
  - Color space and spectral PCS metadata in header
  - **spectralViewingConditionsTag**
  - **customToStandardPcsTag**
  - **standardToCustomPcsTag**
- Spectral and custom colorimetric PCS processing is performed using Profile Connection Conditions (PCC)
- PCC information can come from either the profile or externally provided to the Color Management Module (CMM)
- Profile Connection Conditions are NOT required for legacy colorimetric PCS processing

Profile Connection Conditions
特性檔連接條件





Allows PCS data in profiles to use actual viewing conditions
No need for chromaticAdaptationTag!
允許特性檔中的 PCS 數據，來應用實際的觀察條件
無需 chromaticAdaptationTag!

- 特性檔連接條件包括：
  - 色彩空間和光譜 PCS 的元數據在標頭
  - **spectralViewingConditionsTag**
  - **customToStandardPcsTag**
  - **standardToCustomPcsTag**
- 光譜和自定比色法 PCS 的處理是執行於特性檔連接條件 (PCC)
- PCC 的信息可以來自特性檔或外部提供的色彩管理方法 (CMM)
- 特性檔連接條件不需要傳統的比色法 PCS 處理

Fluorescence and Sparse Matrices
螢光和稀疏矩陣

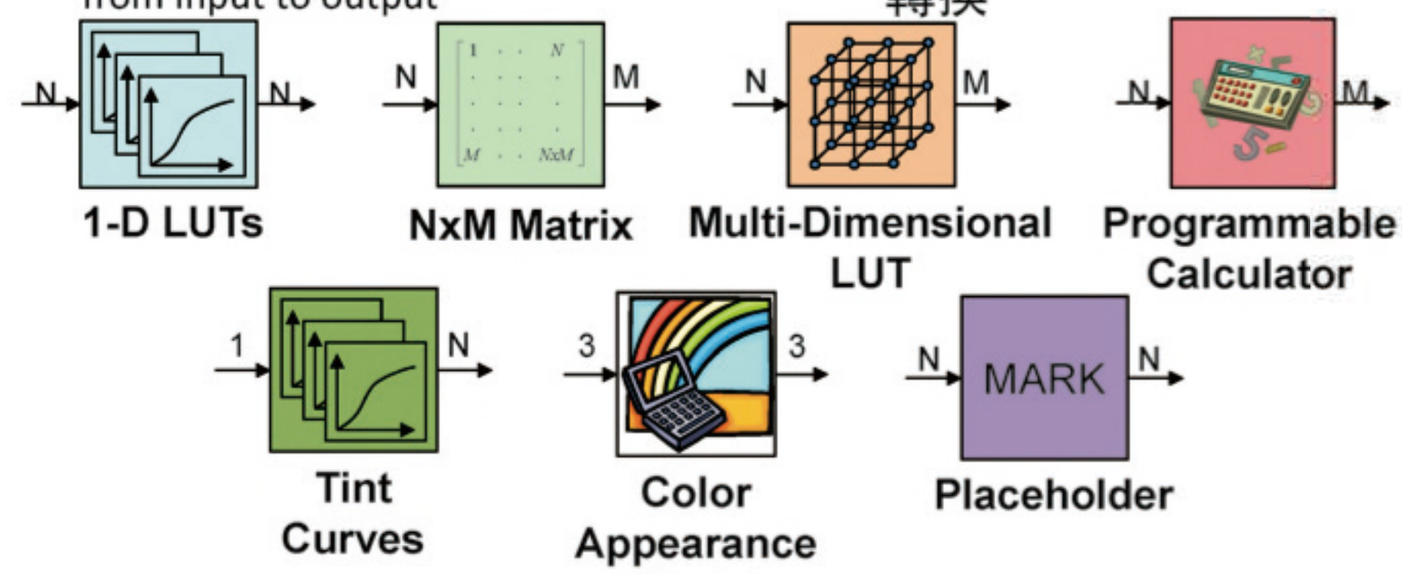
- Fluorescence can be modeled using a "Donaldson Matrix"
  - "Diagonal" terms specify reflectance factor
  - Off-diagonal terms specify emission due to fluorescence
- 使用"唐納森矩陣"可塑造螢光
  - 術語 "對角" 指定反射系數
  - 非對角線術語意指螢光的散射
- Most of matrix is zero filled (black)
  - Storing all entries is wasteful
  - Processing all entries is wasteful
- 大多數的矩陣填入為零（黑色）
  - 儲存所有條目是浪費的
  - 處理所有條目是浪費的

$$\mathbf{v}_{emission} = \left[\begin{array}{c}\text{Excitation wavelength (nm)}\\ \text{Emission wavelength (nm)}\end{array}\right] \times \mathbf{v}_{illuminant}$$

- Sparse Matrix Support
  - Uses compressed row order encoding
  - PCS values can be sparse matrices
- 支援稀疏矩陣
  - 使用已壓縮的行順序編碼
  - PCS 值可以是稀疏矩陣

Processing with multiProcessElements
multiProcessElements 的處理

- Allows processing workflows to be defined using an arbitrary order of flexible processing elements with 32bit floating point processing
- Completely defines transformations from input to output
- 允許處理工作流程定義為以使用32位浮點的任意順序靈活處理單元處理方法
- 完全地定義出從輸入到輸出的轉換



Programmable Calculator Element

- Provides mechanism for encoding more complex (non-linear) device models
  - Avoids limitations of Color Look-Up Table(CLUT) input channel dimensionality
  - Direct encoding of Polynomial Regression
  - Allows for addressing LUTs using polar notation
  - Possible to embed and use other processing elements
  - Results in smaller potentially more accurate profiles



- Defines a script based expression calculator to determine output channels based upon input channels
  - Uses a sequence of operations that apply to an Reverse Polish Notation (RPN) argument stack
  - Finite memory storage for temporary results
  - Nearly all operations are vector based (operating on multiple channels at same time)
  - Secure deterministic behavior

可編寫計算器元素

- 提供機制，用於編碼更複雜的（非線性）設備模型
  - 避免限制顏色對照表（CLUT）的輸入色版的維數
  - 多項式回歸的直接編碼
  - 允許使用原點/極記號編寫對照表
  - 可以嵌入和使用其他的處理元件
  - 使特性檔有可能稍微更準確



- 定義一個基於運算語法方式的計算器來根據輸入色版決定輸出色版
  - 採用了適用於逆波蘭表示法（RPN）參數堆疊的操作順序
  - 有限的記憶體用於存儲臨時結果
  - 幾乎所有的操作都是以向量為基礎（同一時間在多個色版運作）
  - 安全確定性的行為

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Bidirectional Reflectance Distribution Function (BRDF) Tags
雙向反射分佈函數（BRDF）標籤

- Many surfaces change appearance as viewing angle or illumination angle changes
- A Bidirectional Reflectance Distribution Function (BRDF) can be used to characterize these properties
- Proposed new optional BRDF tags in a profile help communicate this information about color

- 許多表面的外觀都會因視角或光照角度而變化
- 雙向反射分佈函數（BRDF）可以用來描述這些特性
- 在特性檔內新提出的選擇式 BRDF 標籤可幫助溝通有關的顏色資訊



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Named Profile Changes
特性檔命名的轉變



- Named colors defined using a new general purpose hierarchical structure
- For each named color the following things can be defined:
  - Name (and optional localized names)
  - Optional Color information for **multiple tints**
    - Device value designation (Ex. CMYK, or RGB)
    - Colorimetric representation
    - **Spectral representation**
      - Overprint over white
      - Optionally overprint over black
  - Optional **BRDF Information**
  - Optional Private Information (due to hierarchical nature)

- 使用全新的通用層次結構定義特性檔命名
- 對於每個命名的顏色，以下的項目可被定義為：
  - 名稱（選擇性自定名稱）
  - 可選擇**多色調**的顏色資訊
    - 設備數值的標識（如：CMYK 或 RGB）
    - 色度法的陳
    - **光譜的陳述**
      - 白色疊印
      - 可選擇黑色套印
  - 選擇性的 **BRDF 資訊**
  - 選擇性的私人資訊（適當的層次性）

Color Encoding Profile Class
顏色編碼特性檔的類別



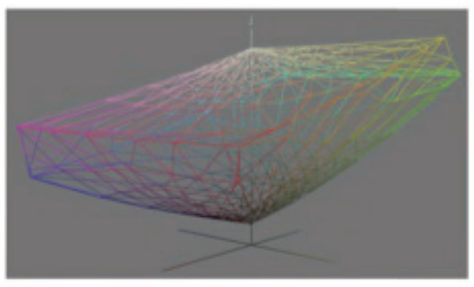
- Allows a profile to specify **what color data is**
- Does **NOT specify how color data should be transformed**
- A single required tag referenceNameTag contains name of color space encoding
- Two additional tags allows color space encodings to be defined or attributes to be overridden
- The CMM provides an “appropriate” transform

- 允許特性檔**指明數據是什麼顏色**
- **不會指定顏色數據應該如何被轉化**
- 標籤 referenceNameTag 必需包含色彩空間編碼的名稱
- 兩個額外的標籤容許色彩空間編碼的定義或屬性要重寫
- CMM 提供了一個 “適當” 的轉換

Optional Gamut Boundary Description Tags
選擇性色域邊界描述標籤

- New gamut boundary description tags can be included to define colorimetric gamut boundary for each rendering intent
- Allows for 3-dimensional aspects of gamut to be identified and used by applications and dynamic CMM’s

- 色域邊界描述標籤可被包含，用以定義每種色彩轉換的色域邊界
- 允許色域的3維外觀被標識和用於應用程式和動態的 CMM



IccLabs General Profile Contents



- Display / Device / Color Space Profiles
  - Header (with spectral PCS)
  - Metadata Tags
  - *Profile Connection Conditions Tags*
  - *Colorimetric Transform Tags*
    - AtoBx / BtoAx : *lut8, lut16, lutAtoB, lutBtoA, multiProcessElementType*
  - *Spectral Transform Tags*
    - DtoBx / BtoDx : *multiProcessElementType*
- *Note 1: PCS and Spectral PCS entries in header determine whether colorimetric and/or spectral transform tags are needed*
- *Note 2: Profiles are valid when only relative or absolute transforms are present*
- Device Link Profiles
  - Header
  - Metadata Tags
  - Transform Tags
    - AtoB0 : *lut8, lut16, lutAtoB, multiProcessElementType*
- *Named Color Profiles*
  - Header (with spectral PCS)
  - Metadata Tags
  - Profile Connection Conditions Tags
  - Transform Tag
    - Named Color Table : *namedColorTagType, tagArrayType(namedColorArray)*
- Standard Color Space Encoding Profiles
  - Minimal Header
  - Encoding Space Type (and Name)
  - *Optionally override color space encoding parameters : tagStructType*

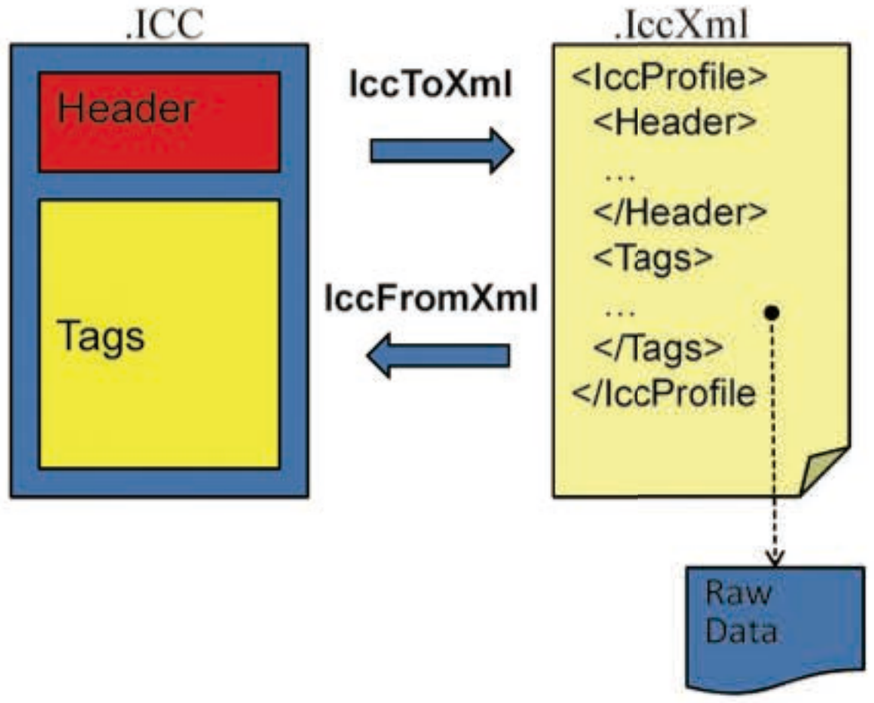
IccLabs 一般資料內容



- 顯示/設備/色彩空間特性檔
  - 標頭 (包括光譜 PCS)
  - 元資料標籤
  - *特性檔連接條件標籤*
  - 比色法轉換標籤
    - AtoBx / BtoAx : *lut8, lut16, lutAtoB, lutBtoA, multiProcessElementType*
  - *光譜轉換標籤*
    - DtoBx / BtoDx : *multiProcessElementType*
- *註 1：PCS 和光譜 PCS 在標頭項目決定比色法和/或光譜轉換標籤是否都需要*
- *註 2：當只有在相對或絕對轉換時，特性檔是有效的*
- 設備連接特性檔
  - 標頭
  - 元資料標籤
  - 轉換標籤
    - AtoB0 : *lut8, lut16, lutAtoB, multiProcessElementType*
- 命名顏色特性
  - 標頭 (包括光譜 PCS)
  - 元資料標籤
  - *特性檔連接條件標籤*
  - 轉換標籤
    - 顏色命名表: *namedColorTagType, tagArrayType(namedColorArray)*
- 標準色彩編碼特性檔
  - *最小限度的標頭*
  - *色彩空間編碼類別(包括名稱)*
  - *選擇性覆寫色彩空間編碼的參數: tagStructType*

RefIccLabs

- Provides a C++ reference implementation of profile manipulation and application proposed by IccLabs specifications
  提供一個由IccLabs規範提出特性檔的操作和應用程序的C＋＋實踐參考
- Simultaneously supports both binary and XML representations of profile data
  同時支援特性檔數據以二進制和 XML 表現
- Libraries and tools 資料庫和工具
  - IccProfLib (.ICC)
    - IccApplyNamedCMM
    - IccApplyProfiles
    - IccDump
    - wxProfileDump
  - IccLibXml (.IccXml)
    - IccFromXml
    - IccToXml



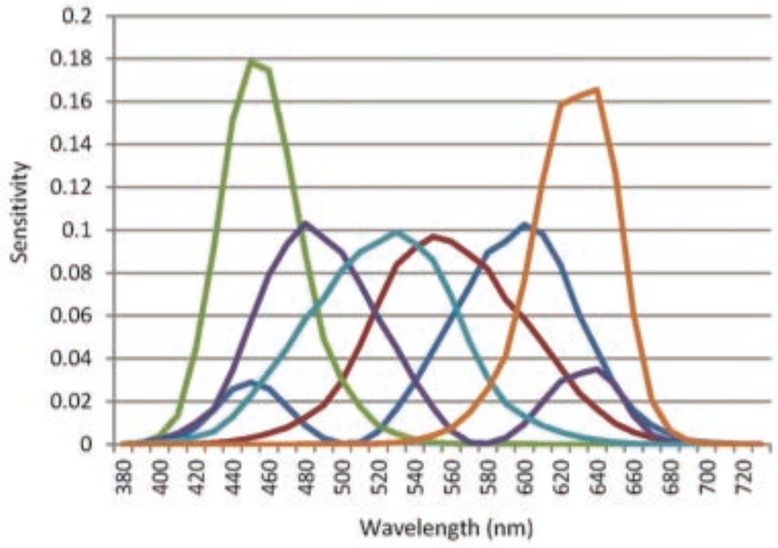
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Worked Spectral Example
可行的光譜例子

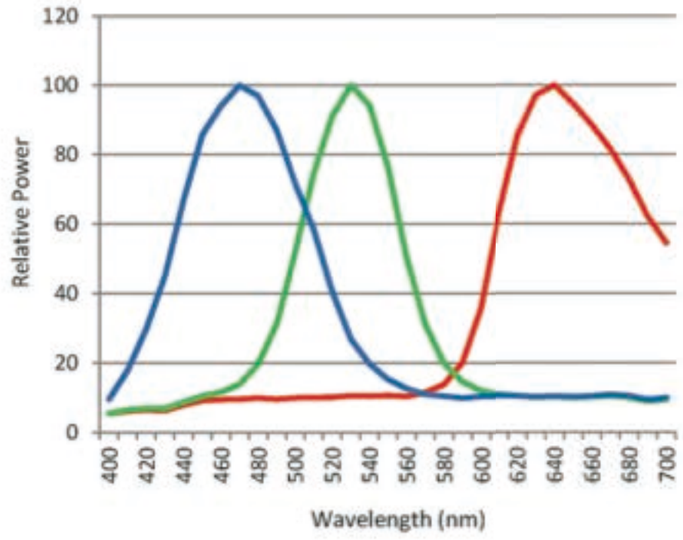
Using 6-channel multi-spectral “camera” profile
with Various Spectral PCS/PCC Operations
via Application to TIFF images
使用 6 個色版的多光譜“相機”特性檔與各種
光譜 PCS/ PCC 操作應用於 TIFF 圖像

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Test Profile Connection Conditions
測試特性檔連接條件



Six Channel "Camera" Sensor Fundamentals
6 個色版的"相機"感應器原理



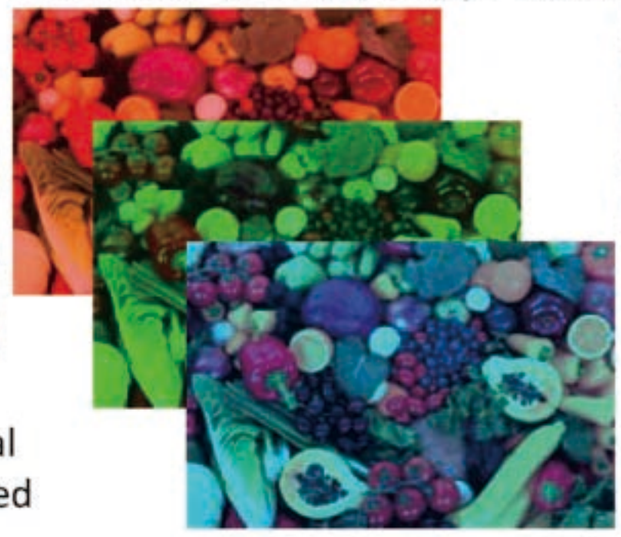
Illuminant Spectral Power Distributions
光源的光譜功率分佈

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ICC Multi-Spectral Image Processing
ICC多光譜影像處理



6-channel multi-spectral "camera" image attached to sRGB profile with Standard PCC
6個色版的多光譜"相機"影像連接至附帶標準 PCC 的 sRGB 特性檔



Application of PCC's with Red, Green, & Blue illuminants with NO chromatic adaptation
應用沒有色彩適應的 RGB 光源的 PCC



Application of PCC's with Red, Green, & Blue illuminants with COMPLETE chromatic adaptation
應用完整色彩適應的 RGB 光源的 PCC

Conclusions
結論

Benefits/Opportunities with IccLabs
IccLabs 的效益／機會

- Spectrally based workflows
  - Communicate and account for physical properties of light and surfaces
  - Handle variability in lighting and observer
- Flexible processing elements
  - Enable more complex device models
  - Allow color/vision science to be directly encoded in a profiles
- New data structures, data types and profile class
  - Provide for Named Color specification flexibility
  - Allow for complex data relationships to be easily encoded
  - Allow for easier future extendibility
  - Simplifications for standard color encodings

- 以光譜為基礎的工作流程
  - 光與表面的物理性質的溝通和記錄
  - 處理光和觀察者的差異
- 靈活處理單元
  - 能使用更複雜的設備模型
  - 容許顏色／視覺科學直接在特性檔內譯成編碼
- 新的數據結構、數據種類和特性檔級別
  - 提供命名色彩規格的靈活性
  - 允許複雜的數據關係，可容易地編碼
  - 使未來的可擴展性更方便
  - 標準顏色編碼的簡化

Industries that can possibly benefit
能受益的行業

- Medical Imaging
- Fine Art Reproduction
- Motion Picture and Video Industries
- Academic Research
  - Color Science
  - Vision Science
- Industrial Color

- 醫療影像
- 藝術品複製
- 動畫及錄像行業
- 學術研究
  - 色彩科學
  - 視覺科學
- 工業用的顏色

Considerations for Digital Printing/Packaging
數碼印刷／包裝的注意事項

- It should be noted that ICC V2/V4 profiles work well for conventional process printing workflows
  - IccLabs isn't a mission critical consideration
- Possible advantages from IccLabs
  - New processing elements
    - Direct modeling in profile (possibly smaller more accurate profiles)
  - Proofing realism
    - Lighting considerations - metamerism, fluorescence, and angular dependencies
  - Named Color Profiles
    - Specification of tint colors
    - Specification of ink formulation (rather than color appearance)
      - Spectral reflectance, overprints, fluorescence, BRDF
  - Color Encoding profiles
  - More resources for Smart CMM's to do a better job

- ICC V2/V4 特性檔在傳統印刷流程運作得很好
  - IccLabs 不是關鍵的考慮因素
- IccLabs可帶來的優勢
  - 新的處理元素
    - 直接在特性檔中製模 (使特性檔有可能稍微更準確)
  - 現實化打稿
    - 燈光的考慮 – 同色異譜、螢光劑、和角度從屬
  - 命名顏色特性檔
    - 平網的規格
    - 油墨配方的規格(而不是色彩外觀)
    - 光譜反射、疊印、螢光劑、BRDF
  - 顏色編碼特性檔
  - 更多資源提供智能CMM來製作更好的效果

International Color Consortium®

Thank You!
謝謝!

Questions?
提問?

論壇
Forum



Prof Brian P. Lawler
加利福尼亞州立大學圖像傳播副教授
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Brian Lawler授教色彩管理及品質評估、數碼攝影、印前、書刊設計及高階文字學的科目。

他是一位圖像藝術及攝影行業專家超過40年，範圍包括攝影、文字學、印前、製版、印刷及生產。

Lawler是一位色彩管理及印前色彩整合系統專家，作為顧問，他曾為世界各地多間企業提供服務，包括柯達、蘋果電腦、惠普、Adobe、施樂、美國愛普生及尼康。

他是Adobe印刷生產指南的官方作者，此指南於2005年出版，並出版成多個語言的版本，包括英文、法文及土耳其文版本，他亦設有一個有關圖像藝術的博客 blognosticator.org。

Brian Lawler teaches courses in Color Management and Quality Assessment, Digital Photography, prepress, book design, and Advanced Typography.

He is a graphic arts and photographic industry expert with over 40 years' experience in photography, typography, prepress systems, platemaking, press and production systems.

Lawler is a specialist in color management systems and the integration of precision color systems in prepress work flows. As a consultant, he has worked worldwide for firms including Eastman Kodak Company, Apple Computer, Hewlett-Packard, Adobe Systems, Xerox, Epson America, and Nikon.

He is the author of the Official Adobe Print Production Guide, published in 2005. That book has been published in English, French and Turkish editions. He also has a blog on graphic arts topics at blognosticator.org.

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