Achieving Great Output Quality with Your Paper

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Agenda

- Paper manufacturing and characteristics
- Quality considerations for stock selection
- Proper storage techniques
- Optical brightening agents
- Paper-critical configuration for digital print systems
- Automated workflows for paper configuration and print processing
Paper characteristics
Paper making process

• Before machines made paper, pulp materials were hand laid
• Modern mechanized paper manufacturing lays pulp on a conveyor screen to enable continuous feed delivery to web roll
Grain direction

- Paper manufacturing imparts a grain direction
Grain direction

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  – “Grain” is the orientation of pulp
  – When paper fibers absorb water, they expand in width
    • Changes in humidity cause the sheet to “grow” in cross-grain dimension
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    - Changes in humidity cause the sheet to “grow” in cross-grain dimension
- Substrates have more dimensional stability against the grain and tear more easily with the grain
Example of cheap book manufacture

- Cross-grain binding causes cracking on the fold
Example of cheap book manufacture

• Cross-grain binding causes cracking on the fold
Paper weight

- Refers to caliper of paper
- Basis weight defined in “pounds”
- Paper weight effects digital print manufacturing
Measurement of paper weight (mass)

• Basis weight is the weight of one ream (500 sheets) cut to a trade size
  – Bond = 17”x22”
  – Book = 25”x38”
  – Cover = 20”x26”

• GSM or “grammage” is the weight of one sheet of a paper, one square meter in dimension
### GSM table

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Paper coating

• Coated
  – Clay coating applied to paper surface
  – Allows for a wider gamut and dynamic range

• Uncoated
  – Plain paper with no coating applied
  – Matte finish preferred for some print applications
  – Reduced adhesion of colorants limits dynamic range

• Calendared
  – Steam and pressure smoothing of paper surface
Paper coating impact on imaging

• Stock finish influences colorant adhesion
  – Clay-coated stocks tend to have larger gamut
Paper coating impact on imaging

- Stock finish influences colorant adhesion
  - Clay-coated stocks tend to have larger gamut
Fuser in laser imaging system
Fuser temperature

- Heavier substrates require higher fuser temperature
  - Increases colorant transfer
Paper brightness or whiteness

- **Brightness** is defined by TAPPI in the U.S.
  - Reflectance of blue light
    - 44 nm wide band at 457 nm
    - ISO 2469 rarely used

- **Whiteness** is CIE standard (Europe)
  - Amount of reflectance of daylight (D65)

- Either value is often greater than 100
- Effects dynamic range of print
Paper brightness or whiteness
Paper shade

• Colorimetric Measurement of paper white
  – Expressed in L*a*b* units
Standard paper grades

- **Paper type 1**: Gloss or matte coated paper
- **Paper type 2**: Gloss or matte coated paper
- **Paper type 3**: Publication grade low weight coated
- **Paper type 4**: Uncoated white offset
- **Paper type 5**: Supercalendared (uncoated publication grade)
Printing specifications - GRACoL
Paper problems

- Humidity
- Paper curl
- Dust
  - Uncoated paper with paper dust in the package
- Customer requirements
- Optical Brightening Agents (OBAs)
Paper storage

- Climate control
  - Store paper in same environment as press
  - Temperature
  - Humidity
  - Avoid direct sunlight
Optical Brightening Agents
Understanding Optical Brightening Agents (OBAs)

• Most stocks contain chemicals that cause the substrate to fluoresce or “glow”
  – Paper appears brighter and whiter
• The brightening effect of OBAs relies on the presence of ultra violet (UV) light
  – OBAs fluoresce in the presence of UV
• OBAs tend to make the stock look more blue
Standard viewing conditions for color printing – ISO 13655

- In 2009, ISO spec changed to include UV
- So modern light booths excite OBAs in printing stock
Measuring color on OBA-containing substrates

• If **UV** is filtered **out** of measurements used to create an ICC profile, printed color will appear too **yellow** on a sheet **with OBA**s
  – Unfortunately, the majority of the spectrophotometers sold in the last 20 years are these “UV-cut” models
Profiling substrates with OBAs

- D50 is the standard for inspecting and approving color print products world-wide
- D50 lighting to illuminate color prints is defined in ISO specification 3664:2009
- M1 measurement condition matches this
  - To factor out optical brighteners in paper, always measure M1
Paper-critical configuration for digital print systems
Print settings agenda

• Paper weight and type
• Calibration
• Color profiling (characterization)
  – Measure color gamut capacity on a given stock
• Calibration and profile depend on consistent image quality settings
  – Even through these settings are not stock-specific
Print settings

- Paper weight
- Paper type
- Output profile
  - Output profile linked to calibration set
- Image quality settings used for calibration and profiling *must* be used for production
Paper type
Paper weight
Calibration

• Calibration is *essential* for consistent results
  – Factory calibration sets work best with the exact stock they were created for
• Must be preformed on the actual job stock
• Calibrate a substrate right before using it
Color profiling (characterization)

- ICC output profiles are used in color managed workflows to achieve maximum color quality and to match industry references
  - Fogra, GRACoL (G7)
- Custom ICC profile for the actual stock required for conformance
- Use M1 measurements for OBA papers
Output profile

Use job defined settings
- Fiery Generic Plain US Test
- Fiery Generic Coated US Test

Description:
Uses selected profile for output conversions.
Calibration
Paper stock management
Media management

• Automating media management
  – Presets
  – Hot Folders
  – Virtual Printers
  – Paper Catalog
Presets

- Fiery server presets allow all job settings to be configured in a single click
  - Available in Fiery System 10 and later
  - Can be saved on client machine or on Fiery server to be used shop wide
Presets
Hot Folders

• Automated method of sending documents to a Fiery server
  – Drag and drop documents onto a hot folder
  – Prepress workflow system can also send PDFs to hot folders
  – Configure hot folders with server preset

• Preflight can be automated in hot folder
Virtual Printers

- Create a specific configuration with print settings for an output device
  - Accessible for all workstations on the LAN
- Virtual Printers can automate preflight (similar to Hot Folders)
- Configure using a Fiery server preset
Virtual Printers
Virtual Printers
Paper Catalog

- Centralized media management database
- Most efficient way to configure print settings and synchronize with print engine
  - Allows output profiles to be assigned separately for front and back of sheet
Paper Catalog
Mixed media workflows

• Mixed media workflows allow complete booklets to be manufactured from a single PDF

• Use paper catalog for profile assignment

• Consider engine adjustment time
  – Short/long edge feed
Getting the right calibration and profile for a substrate

• Assign **output profile** and linked **calibration** for a substrate using one of the media management strategies

• A custom calibration set and output profile must be created for **each** substrate
  – Or for one per side for a case such as C1S stock
  – Fiery Color Profiler Suite Express Profiler is the fastest and easiest method
Fiery Color Profiler Suite – Express Profiler

- Simplifies and streamlines profiling
- Creates a calibration setting with an output profile in 5 easy steps
- Supports all spectrophotometers
- Automatically creates a preset for productivity
  - Combines calibration setting, output profile, and the imaging settings used to create them
Express Profiler demo
1. Launch Fiery Color Profiler Suite
   Express Profile
2. Select your Fiery server and name the calibration set

![Fiery Express Profiler](image)

Select Fiery server:
- Color Printer 1
- (Server name or IP address)

Name:
- 11x17 Coated Stock 105 GSM

Click "Next" to print and measure calibration.
3. Set Job Properties
4. Create the Fiery calibration setting
5. Create the output profile

Congratulations!
You have successfully created a printer profile.

Name: 11x17 Coated Stock 105 GSM
Server: 10.100.138.167

Your setting 11x17 Coated Stock 105 GSM has a calibration set and profile that are now part of the Preset/Virtual printer called 11x17 Coated Stock 105 GSM.

Choose this preset or virtual printer to use this new profile and calibration set.

Test Print

Create a device link using this profile for this server.

Device Link
Express Profiler: Create Virtual Printer or Hot Folder
Express Profiler: Create Virtual Printer or Hot Folder
Express Profiler: Create Virtual Printer or Hot Folder
What we learned

• Paper manufacturing and characteristics
• Quality considerations for stock selection
• Proper storage techniques
• Optical brightening agents
• Paper-critical configuration for digital print systems
• Automated workflows for paper configuration and print processing
Resources

• Additional color management webinars:
  – Three Key Steps to Get the Right Color the First Try
  – The ABCs of Producing the Best Match for Spot Colors
  – Best Practices for Matching Industry Color Standards
  – Color Standards & Specifications

• Upcoming webinars:
  – October 7th Recipe for VDP: A Primer for Creating Successful Campaigns

Register now at www.efi.com/wofwebinars
Resources

- Fiery Global University – Training.efi.com
  - 3-course eLearning bundle
- Configuring Fiery Color Settings to Optimize Print Quality
- How-To: Paper Stock Management with Smart Media
- Demystifying color standards
- UV light FAQ
- Create output profiles with Express Profiler How-to guide and video
- Fiery Online Resources and Fiery How-to Guides
Additional resources

- **www.idealliance.org**
  - Just Enough Video Bank covering topics such as G7 & GRACoL
- **www.fogra.org**
  - Latest news and advice on standards and specifications
- **www.gwg.org**
  - Best practices for publishing and packaging workflows
- **www.xrite.com**
  - More information on “M” illuminants for measurement devices
- **www.wikipedia.org**
  - Detailed overview of PDF/X
Q/A
Thank you!

Connect with Fiery users and EFI experts on Fiery Forums